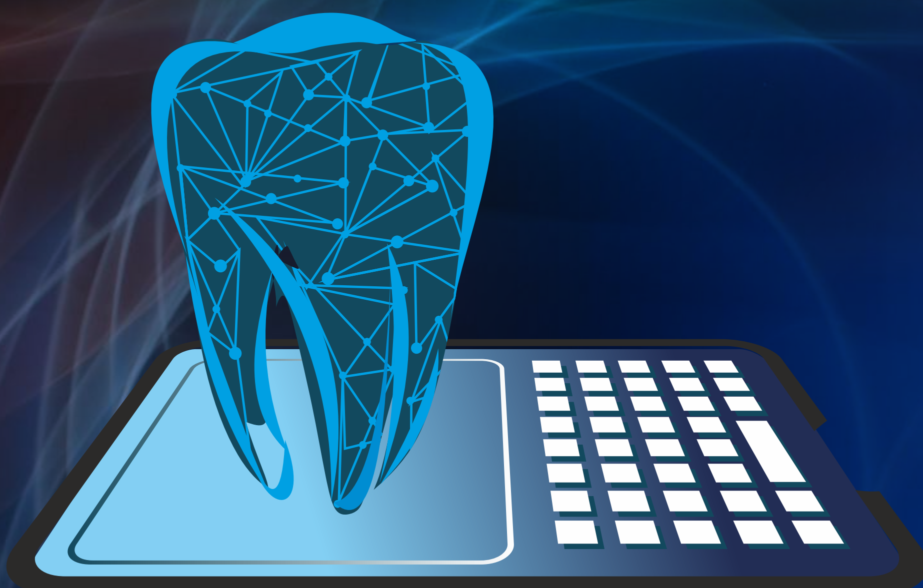
ISSUE-1 - 2023

NEWSLETTER

Computer Aided Implantology Academy
CAI

INDIAN SOCIETY OF
DIGITAL DENTISTRY



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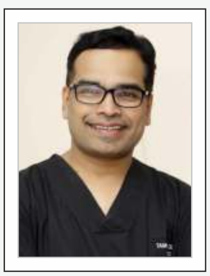

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Newsletter Contents

Editor-in-Chief
Dr. Prashant Jaju
BDS, MDS
(Oral Medicine Radiology)

FROM THE EDITOR'S DESK

FROM THE EDITOR'S DESK

Digital is the buzz word in this century and dental arena is flooded with digital dentistry tools like CBCT, Intra oral scanners , 3D printers and artificial intelligence.

Indian Society of Digital Dentistry is being established with an vision and commitment to create awareness , increase skill level of dental practioners and to educate the younger professionals the intricacies of Digital Dentistry.

Digital dentistry has established its footprints strongly in the dental diagnosis and treatment planning arena and it is of utmost importance that the current generation of dentists utilise the ever increasing dental digital tools for its benefits.

This inaugural newsletter of Indian society of digital dentistry is introduced to showcase the work of our fellow colleagues and reputed digital dentistry experts and to spread the knowledge of digital dentistry tools across the country.

Learning from other's experiences is wisdom and this newsletter wishes to be bridge between the experts and our learned dental colleagues .

Through this newsletter we also wish to invite our dental fraternity colleagues to join hands with the Indian society of Digital dentistry and assist us in establishing digital protocols for the various dental procedures .

Team of Indian Society of Digital Dentistry welcome you all to the Digital World and hopes to make our Indian Dental colleagues specialists in the field of digital dentistry.

Editor-in-Chief
Dr. Prashant Jaju

INDIAN SOCIETY OF DIGITAL DENTISTRY

Message from INDIAN SOCIETY OF DIGITAL DENTISTRY PRESIDENT

Dr. Pankaj Chivte
President of Indian Society of Digital Dentistry

The advent of digitation has brought about significant changes globally and has made a substantial impact in India. Digital technology is revolutionizing various fields of medicine, including dentistry, where tools like scanners, CBCT, CAD/CAM, 3D printing, and milling are transforming patient care. To keep pace with this rapid advancement in in digital dentistry knowledge and technology In India, the "INDIAN SOCIETY OF DIGITAL DENTISTRY- ISDD" was officially founded in 2022 by a group of experienced and tech-savvy dentists. The founding members include Dr. Ratnadeep Jadhav, Dr. Vijay Tamhane, Dr. Pankaj Chivate, Dr. Sanjay Asnani, Dr. Suresh Ludhwani, & Dr. Kaustubh Patil. These founders, who are also multi-practice owners, share a deep passion for digital dentistry and are dedicated to promoting advanced, innovative training in digital dentistry in India, with the aim of enhancing the quality of dental work and creating new opportunities for Indian dentists. Presently, we have been joined by 20 clinicians from various parts of India to expand ISDD's activities to different states.

In terms of revenue, the global digital dentistry market was estimated to be valued at $7.2 billion in 2023, and it is expected to experience a compound annual growth rate (CAGR) of 10.9% over the next five years, reaching $12.2 billion by 2028. Furthermore, this market is projected to undergo substantial growth, with a value CAGR of 13.1%, ultimately reaching $16.3 billion by the close of 2032.

Although digital dentistry's penetration in the Indian market is currently limited, we anticipate rapid growth over the next five years that will revolutionize the dental landscape in India. Presently, there are approximately 3000 intraoral scanner users in India, and we foresee a remarkable tenfold increase in this number within the next five years. Digital dentistry will enable dentists to access expert opinions from specialists in various cities and receive high-quality lab work from different parts of India, thereby elevating the overall standards of dentistry in the country.

After a highly successful convention in Pune last year, attended by more than 800 clinicians with 12 international speakers and 12 industry partners, we plan to hold such conventions bi-annually. Stay tuned for our next event scheduled for November 2024. Additionally, we are currently hosting the Digital Dental Craftsman Convention (DDCC), the first conference for dental technicians and dental practitioners, in Mumbai in October 2023. Furthermore, we are planning to host a digital conference for students in Gujarat early next year. Our aim is to continue fostering the growth and development of digital dentistry in India through these initiatives.

Dr. Pankaj Chivte
President of Indian Society of Digital Dentistry

INDIAN SOCIETY OF DIGITAL DENTISTRY

Message from

INDIAN SOCIETY OF DIGITAL DENTISTRY SECRETARY

Dr Ratnadeep Jadhav
Secretary of Indian Society of Digital Dentistry

Dear colleagues,

The technological advances have revolutionized the practice of dentistry in many ways. We understand the urgency and need for developing a platform to promote Digital Dentistry education in India .We at the Indian Society Of Digital Dentistry (ISDD) are committed towards promoting and propagating knowledge of digital dentistry .The first INTERNATIONAL DIGITAL DENTISTRY AND IMPLANTOLOGY CONCLAVE 2022 PUNE was the first step towards our goal, Around 1000 delegates participated in this 3-day extravaganza ,12 International speakers, apart from scientific presentations plenty of paper and poster presentations during the event.18 major companies in Digital Dentistry as Trade Partners .we received overwhelming response from all sectors of dentistry.

A host of other scientific events throughout the year starting with ' VISUAL IDENENTITY IN DIGITAL DENTISTRY' 3 Day extreme makeover course by the PRO MASTER Miladinov Milos where ISDD first time hosted international delegates for the programme.

We are very proud to announce our first ever convention bringing dental laboratory industry and dental clinicians on one platform in our DIGITAL DENTAL CRAFTSMAN CONVENTION Starting 21 October 2023 .We are sincere in making scientifically vibrant and fulfilling year . I am sure the year 2024 will also be a time of great learning, and our members shall stand tall, and support all our activities with their active participation . Let the old year end and the New Year begin with the warmest aspirations.

Advance Happy New Year!

Dr Ratnadeep Jadhav
Secretary of Indian Society of Digital Dentistry

Message from

INDIAN SOCIETY OF DIGITAL DENTISTRY

ISDD & CAI JOIN FORCES!

Panos Diamantopoulos
President of the International CAI Academy

CAI Computer Aided Implantology Academy + INDIAN SOCIETY OF DIGITAL DENTISTRY

The Indian Society of Digital Dentistry (ISDD) and the International Computer Aided Implantology (CAI) Academy have signed a Memorandum of Understanding (MOU) with the aim of proving and promoting the actual value of 'digital' technologies in 'Dental & Maxillofacial Clinical Practice'.

Both scientific societies share similar 'digital' interests and 'academic' motivations, as well as the passion and the enthusiasm in developing and applying modern computational and manufacturing methods, procedures and protocols in the clinical dental setting.

The International Computer Aided Implantology (CAI) Academy is the oldest 'non-profit' international scientific organization in its field. It has consistently been at the forefront of the development and application of 'Digital Dentistry' and the driving force behind it. Its Active Members are the pioneers and the inventors of Computer Guided Surgery.

"It is the aim of this collaboration to work hand by hand with ISDD and develop further scientific evidence, improve current procedures, facilitate clinical adoption and organise relevant educational activities", says Dr Panos Diamantopoulos, President of the CAI Academy.

As part of this collaboration the ISDD will develop a relevant CAI Academy Membership Chapter and a CAI Training Centre in India, in order to spread the efficient use of cutting-edge technologies and promote the

relevant benefits in clinical dentistry.

In the years ahead, ISDD and CAI remain committed into building a concrete 'digital' collaboration for the benefit of clinicians and patients!

With best 'digital' greetings!

Panos Diamantopoulos
President of the International CAI Academy

www.yourcaiacademy.org
'The Science behind Digital'

FULL MOUTH REHABILIATION OF EDENTULOUS PATIENT USING GUIDED SURGERY PROTOCOL- A CASE REPORT

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Bharati Vidyapeeth (deemed to be) University

ABSTRACT

In edentulous patients, complete dentures are considered the most appropriate treatment option for maintaining normal speech and an aesthetically pleasing appearance and facilitating adequate mastication of food. A number of approaches have been developed to restore edentulous upper and lower jaws, one of which is implant-supported screw-retained prostheses. This case aimed to assess the clinical and radiographic outcome of all-on-6 concept using three-dimensional computer-assisted treatment planning, surgery and subsequent prosthetic rehabilitation.

KEYWORDS

Implants, guided, digital, all-on-6

INTRODUCTION

With the wide spread use of dental implants for restoration of lost dentition, rehabilitation of completely edentulous arches with dental implant has become quite common. All on 6 implant procedure is a widely followed method to restore fully edentulous dental arches. Full arch implant rehabilitation requires correct case selection, astute surgical procedure and careful prosthetic planning for a successful outcome.The fundament of an esthetic and functional implant-supported prosthesis is reliant on proper positioning and angulation of the implant. Precise positioning helps decrease the biomechanical load on the implant, ensures optimal occlusion and implant loading and allows optimization of design of the final prosthesis thereby aiding in maintenance of optimum dental hygiene and ensures long-term success of the prostheses. Therefore, meticulous pre-surgical planning ensures precise placement of the implant according to the virtually planned prosthesis. In this clinical case report, the prosthesis was planned virtually and implant positions were planned digitally in a manner most suitable to support the prosthesis biomechanically.

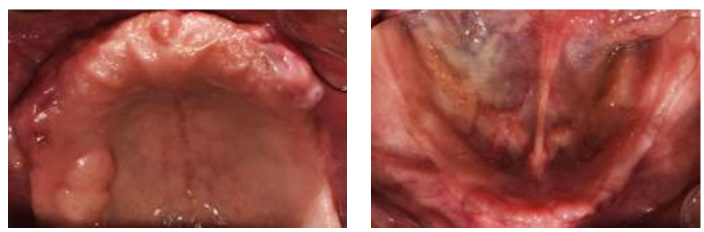
A guide was then fabricated to transfer these placement positions accurately to the oral cavity. The implants were submerged during the healing phase and delayed loading of implants with a screw-retained porcelain-fused-to-metal prostheses was carried out to rehabilitate the lost dentition of the patient.

CLINICAL REPORT

A 59-year-old woman reported to the department of Prosthodontics, Crown and Bridge at Bharati Vidyapeeth dental college and hospital, Pune. She complained of missing teeth throughout her mouth since 3 months and wished to get them replaced. On extraoral examination, the patient was found to have a skeletal class 3 maxillomandibular relationship and decreased lower facial height with collapsed cheeks and everted lips (Fig. 1).

(Fig. 1)

Upon intraoral examination, moderately resorbed completely edentulous maxillary anterior ridge along with severely resorbed completely edentulous maxillary posterior, mandibular anterior and posterior ridges were observed. The overlying mucosa was found to be healthy, firm and resilient (Fig. 2).

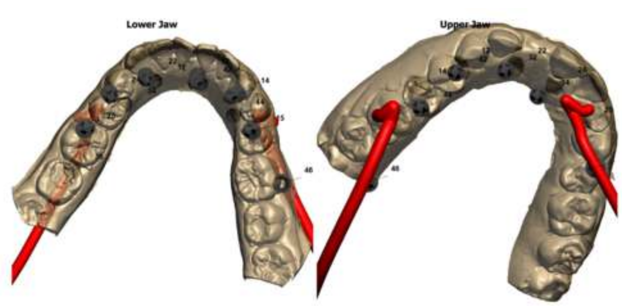


(Fig. 2)

Radiological investigation confirmed the hard tissue findings (Fig. 3). Primary impressions were made and diagnostic mounting was carried out. The patient chose maxillary and mandibular implant-supported fixed prostheses from amongst the treatment options presented.

(Fig. 3)

Full mouth CBCT scans were carried out which revealed D3 dense bone throughout. After evaluating the existing arch form, maxillomandibular relationship, masticatory forces and health of the underlying bone, a 6-implants-supported screw-retained porcelain-fused-to-metal prostheses for each arch was finalized as the treatment plan (Fig. 4).

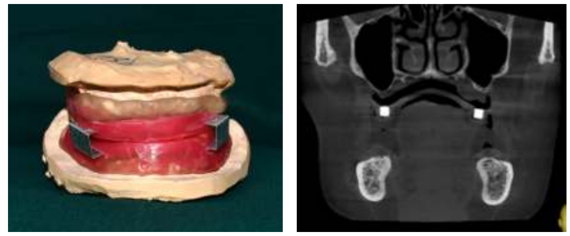


(Fig. 4)

A new set of impressions was made using poly vinylsiloxane (Express XT, 3M USPE, USA) and 3D-printed stents with radio-opaque markers were fabricated on these models (Fig. 5) .

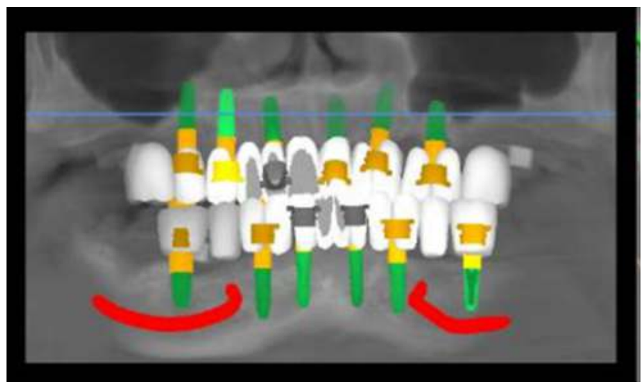
(Fig. 5)

Wax rims were fabricated on these stents, tentative jaw relation was carried out and a CBCT of this recorded jaw relation was carried out (Fig. 6).

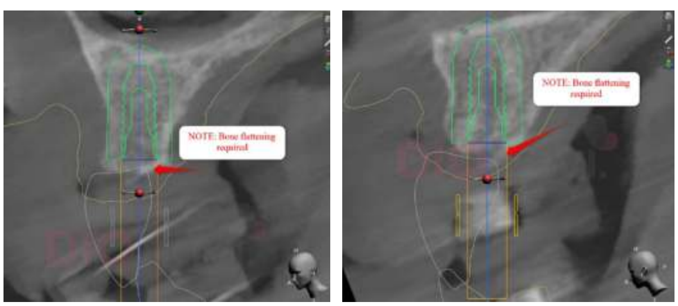


(Fig. 6)

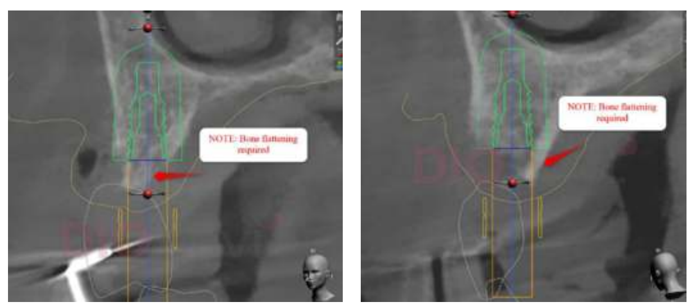
Based on this, the prosthesis was planned virtually and implant positions were planned digitally in a manner most suitable to support the prosthesis bio-mechanically (Fig. 7-13).



(Fig. 7)



(Fig. 8)



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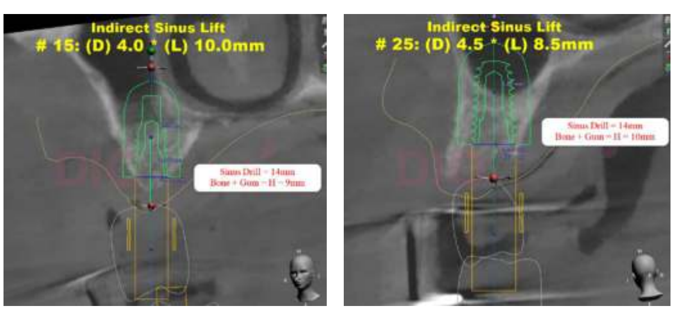

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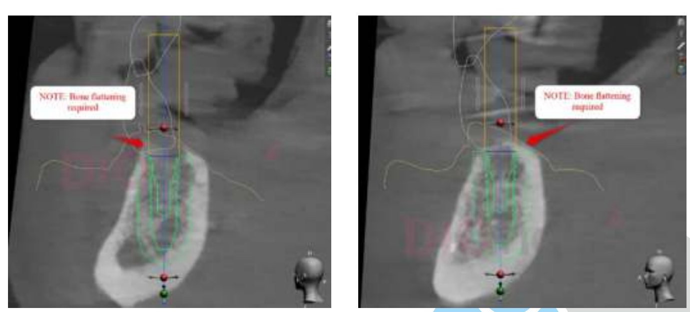

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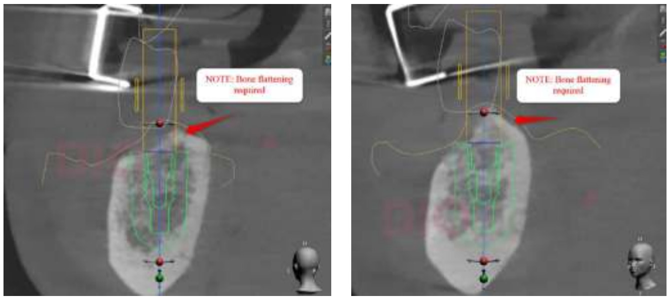
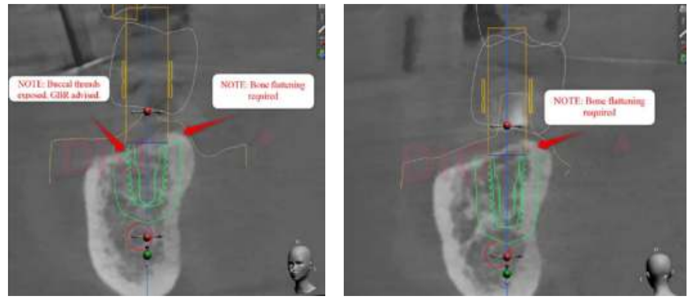


(Fig. 12)

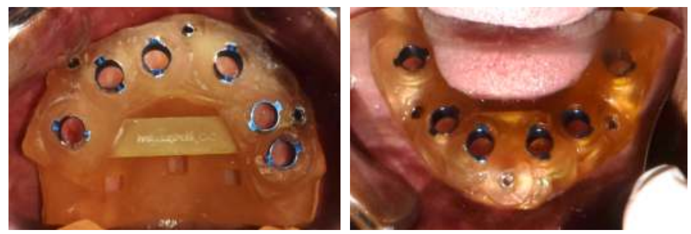


(Fig. 13)

A guide (Dionavi, Korea) was then fabricated to transfer these placement positions accurately to the oral cavity (Fig. 14).

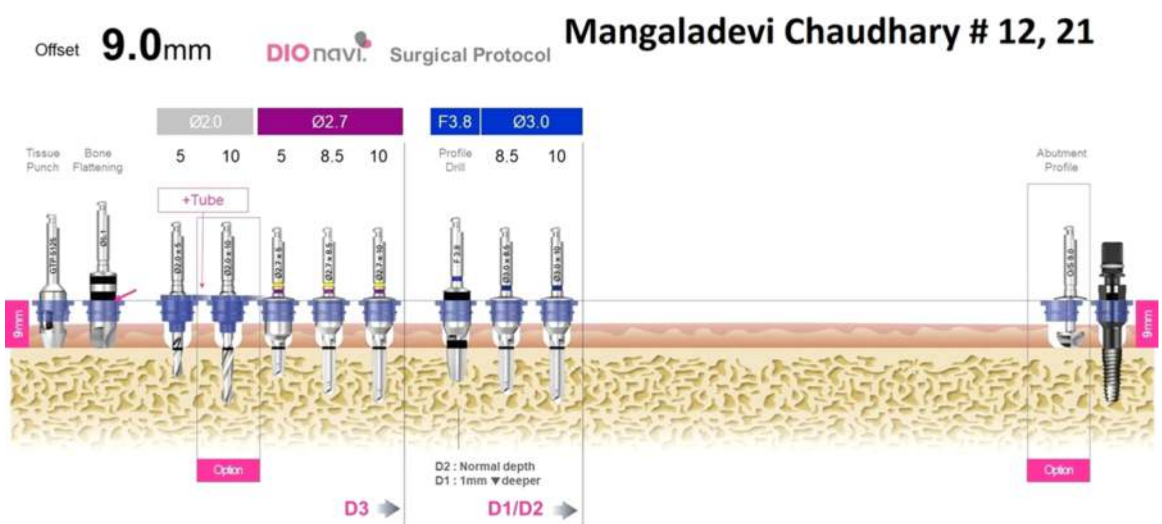
(Fig. 14)

The fit of this guide was verified intraorally and necessary adjustments were made (Fig. 15).

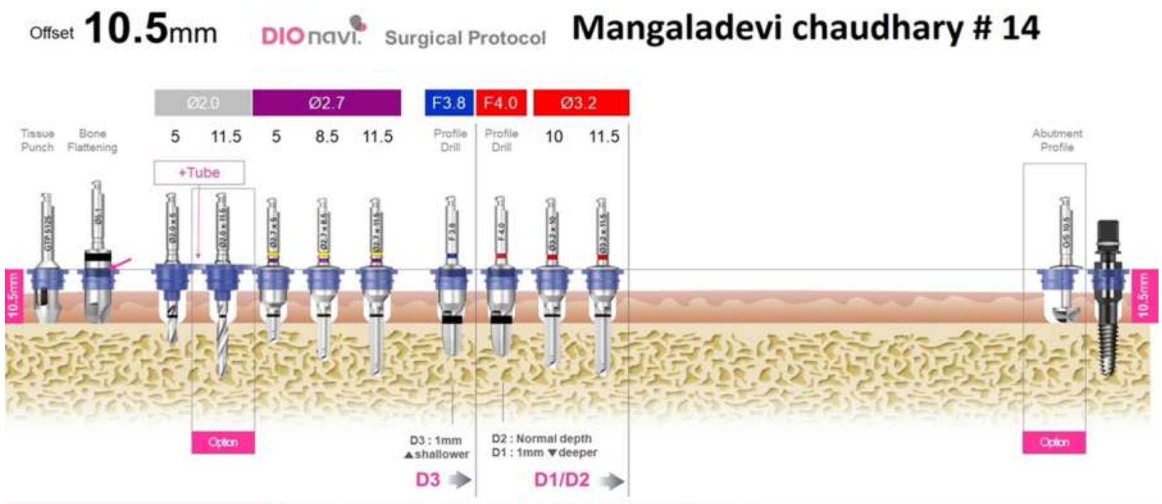


(Fig. 15)

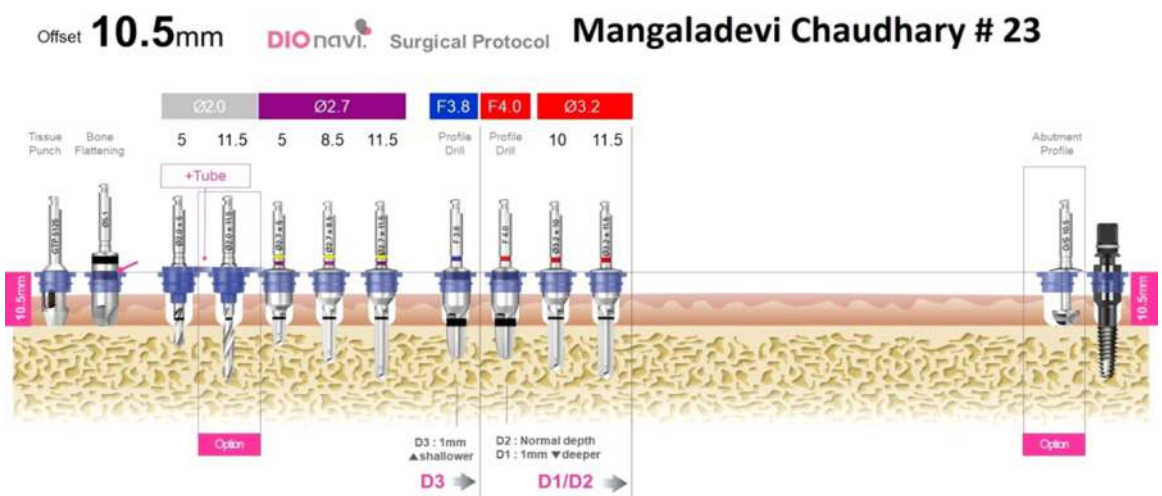
Implants were placed with the aid of the guide (Fig. 16-25).



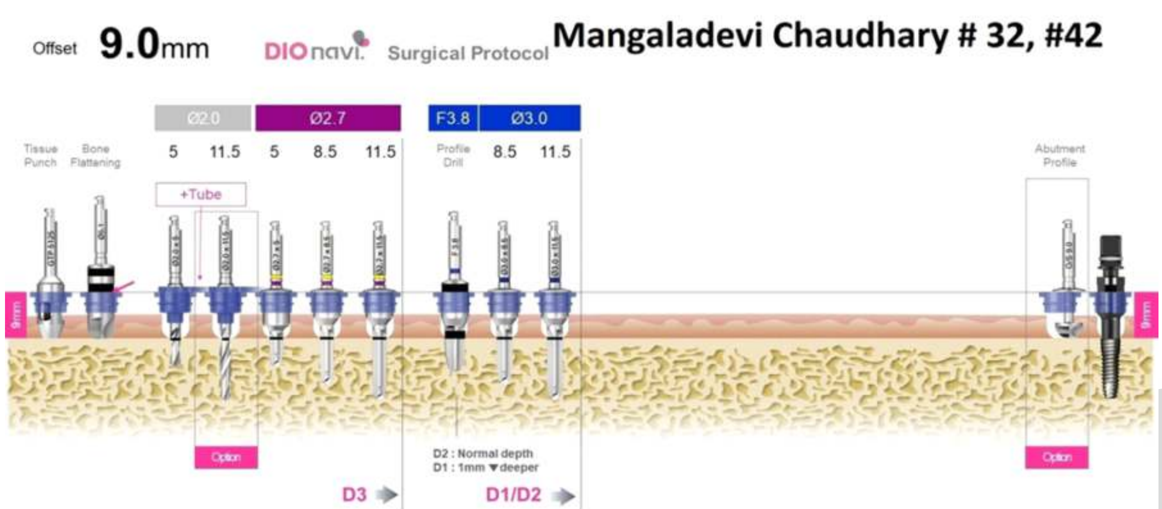
(Fig. 16)



(Fig. 17)



(Fig. 18)



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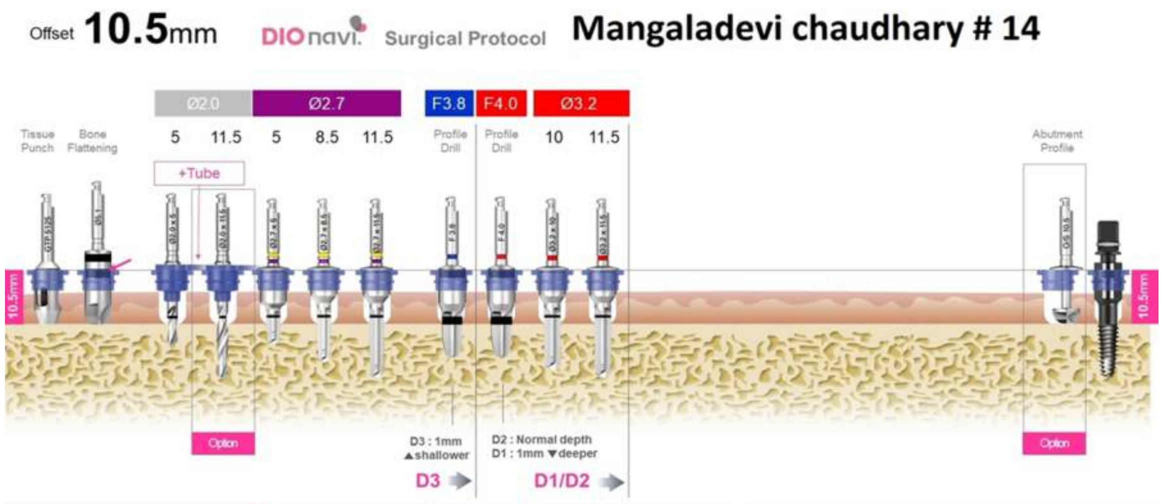
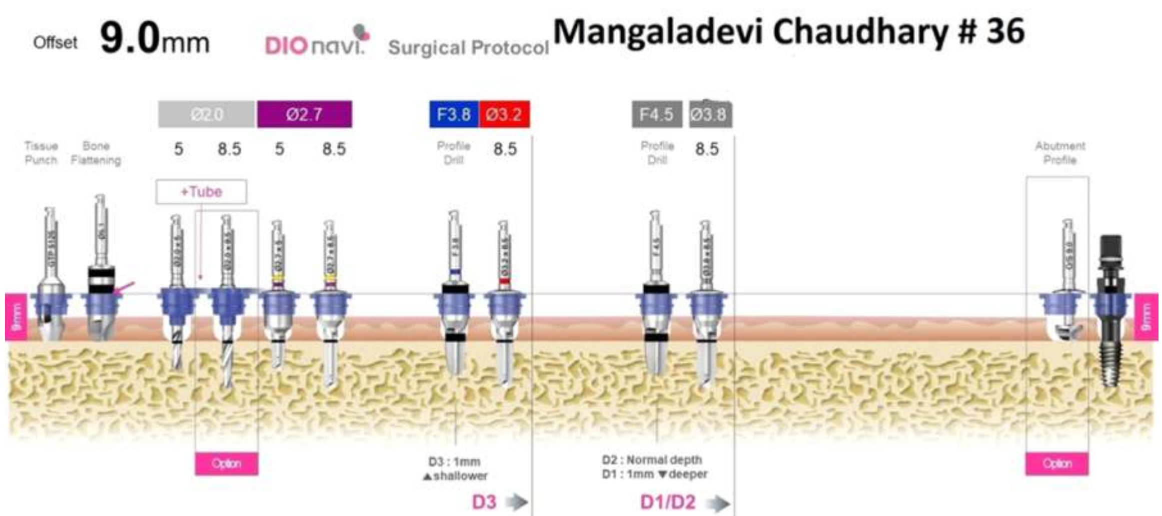
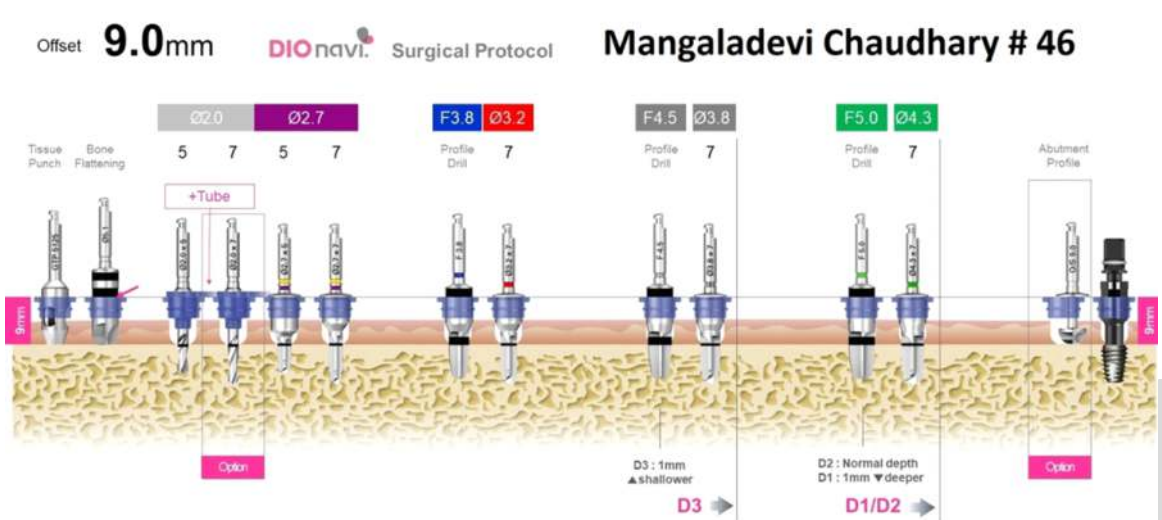


(Fig. 20)

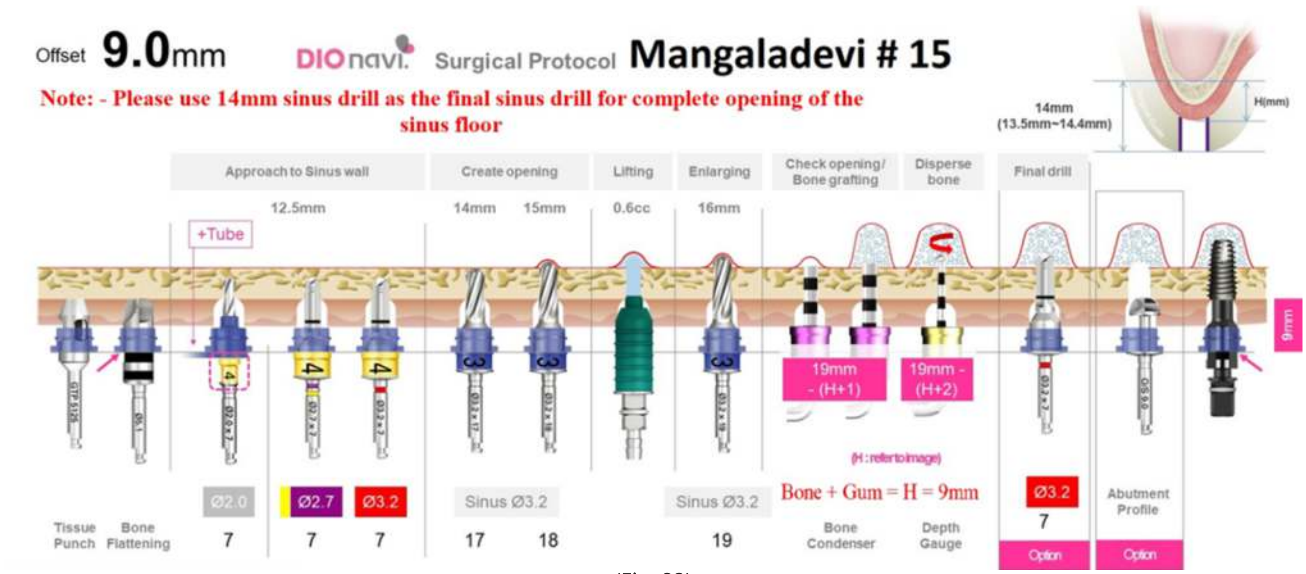


(Fig. 21)

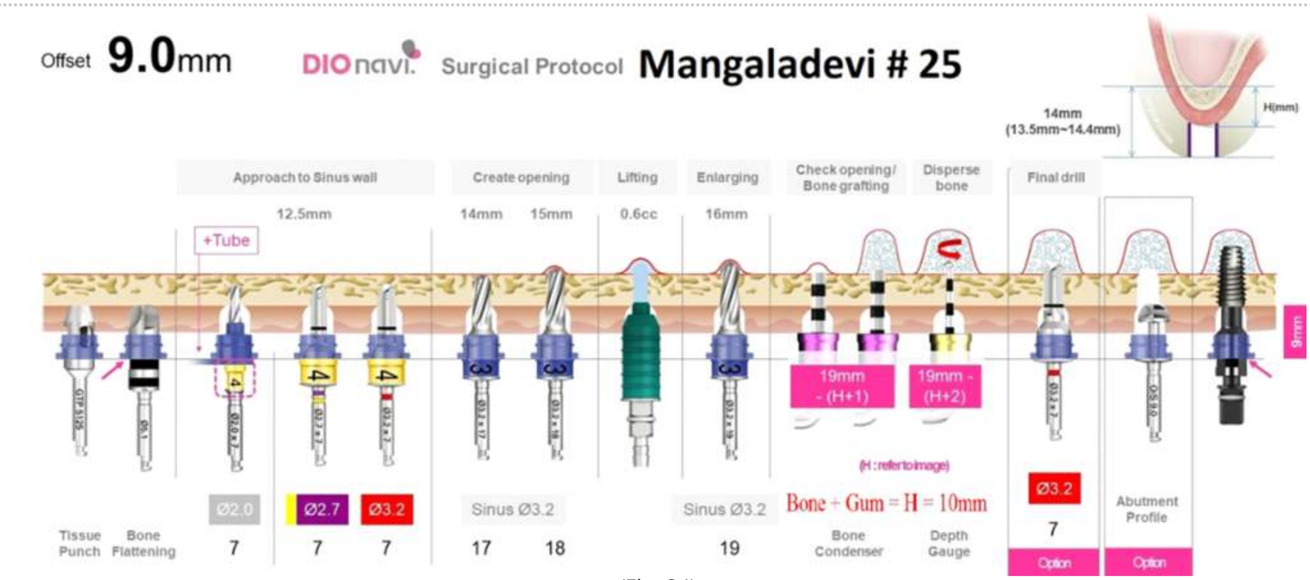


(Fig. 22)

Crestal approach indirect sinus lifts were carried out using the hydraulic technique through the guide in regions 15 and 25, the sites were grafted (NovaBone dental putty, NovaBone, Florida, USA) and implants (Dionavi, Korea) were placed immediately (Fig. 23,24).

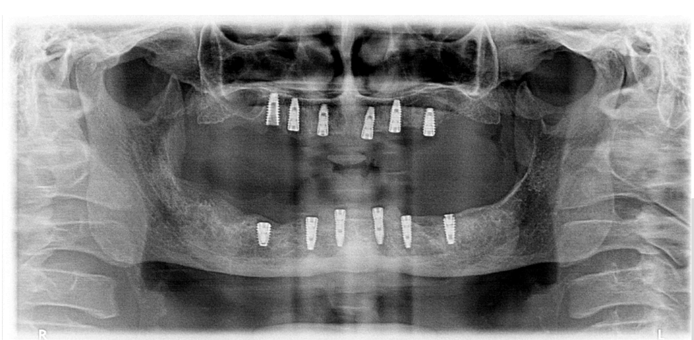


(Fig. 23)



(Fig. 24)

Since a primary stability of 45Ncm was observed in less than 75% of implants in each arch, the implants were submerged for healing.

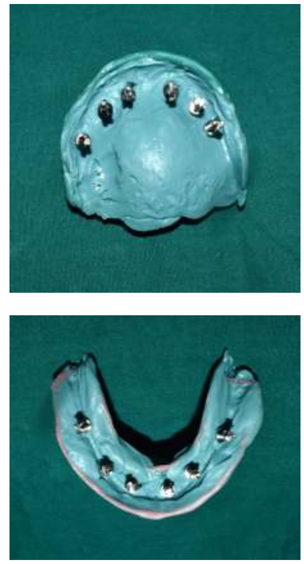


(Fig. 25)

After a period of 3 months, the sites were exposed and gingival formers were placed on all implants. Following this, multiunit abutments were selected (Fig. 26) and open tray impressions were made (Fig. 27, 28).

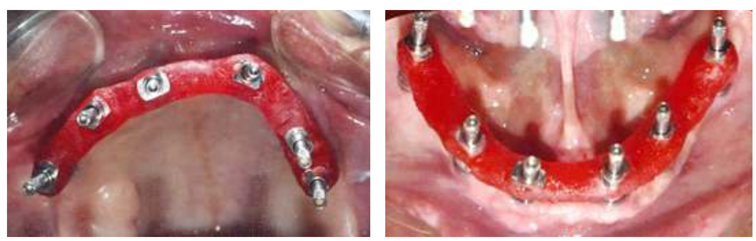

(Fig. 26)


(Fig. 27)


(Fig. 28)

Pattern resin jig trials were carried out and a passive fit of framework was verified both clinically as well as radiographically (Fig. 29, 30).

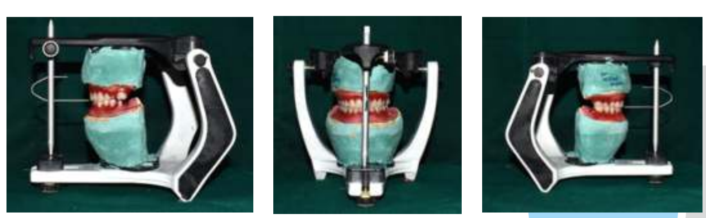

(Fig. 29)


(Fig. 30)

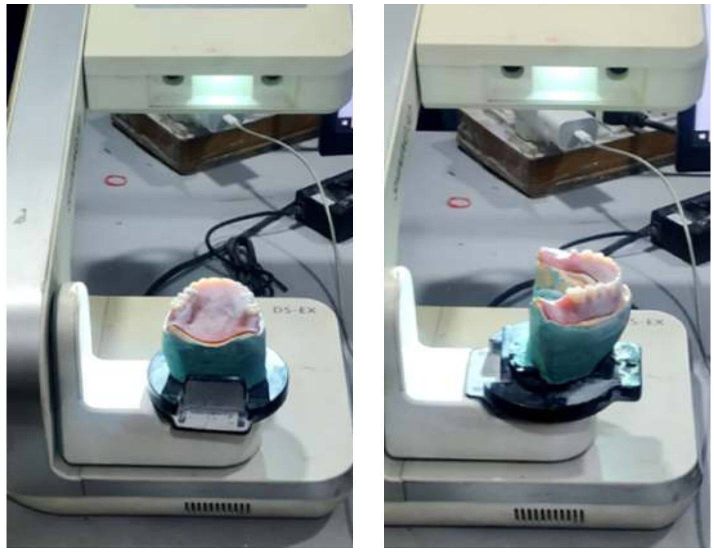
Jaw relations were recorded, facebow transfer (Bioart) was carried out and transferred to an articulator (Bioart). (Fig.31)


(Fig. 31)

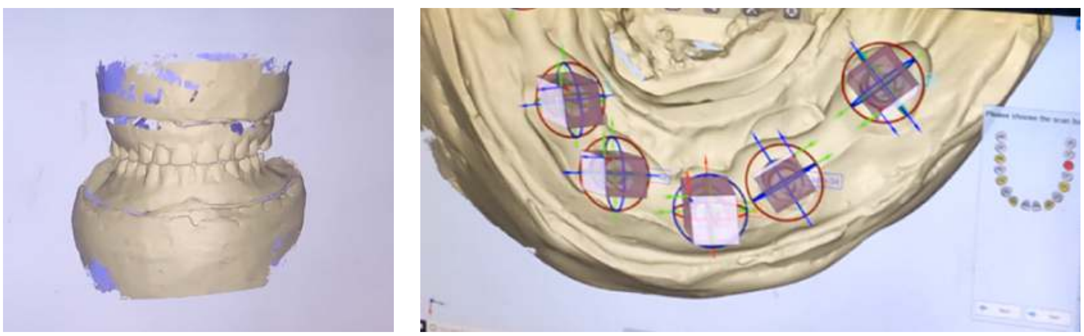
A wax try-in of the teeth arrangement was verified intraorally and occlusal interferences in centric and eccentric movements were eliminated (Fig. 32).


(Fig. 32)

This verified teeth arrangement was then scanned using a white-light laboratory scanner (Shining 3D DS-EX) to be used as a template for the designing of the final prosthesis (Fig. 33,34).



(Fig. 33)



(Fig. 34)

A printed resin trial of the final design was carried out and the necessary modifications were noted (Fig. 35).

(Fig. 35)

The framework was fabricated in cobalt-chromium using direct metal laser sintering and the fit was verified intraorally (Fig. 36). The shade selection for ceramic layering was done in natural daylight taking into account the patient's complexion and the shade of her eyes and hair.

(Fig. 36)

A bisque trial was then performed and occlusal contacts verified using shimstock (Fig. 37).

Upon achieving the desired results, the prostheses were finished and delivered (Fig. 38, 39).

(Fig. 38)

(Fig. 39)

The fit of the prostheses was verified radiographically (Fig. 40).

(Fig. 40)

Restoration of the lower facial height, hollowing of cheeks and an improvement of facial profile was achieved upon extraoral examination (Fig. 41).

(Fig. 41)

DISCUSSION

Given the highly atrophic clinical condition of the case described here, combinations of six implants in the upper jaw and lower jaw were considered the most advisable approach. By placing more implants in the maxilla, the survival rate of the maxillary prosthesis was expected to be very high and similar to that of the mandibular prosthesis. The maxilla is known to generally withstand lower mechanical forces than the mandible due to its relatively thin cortical layer and low density of spongiosa. Also, tilting of implants tends to subject the peri-implant bone to tensile and shear stresses, whereas the bone is most conducive to bear compressive stresses. Hence, six straight implants were planned.Guided surgeries aid in placement of implants in biomechanically sound positions and inclination with higher accuracy. They also reduce the morbidity of the surgical site and are less time-consuming. If the anatomical site is suitable, the use of a guide should be considered for its benefits.The screw-retained fixed prostheses over full-mouth implants is a complex prostheses needing long-term maintenance and follow-up alongside meticulous oral hygiene maintenance, hence patient psychology and effort play a major role in longevity of prostheses.This treatment modality has a definite learning curve but the advantages justify and outweigh it.

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INTRA ORAL SCANNERS: CONCEPT, TECHNIQUES AND COMPARATIVE REVIEW

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The digital age of the 21st century has brought about significant changes in various aspects of our lives. The internet, artificial intelligence, smartphones, social media, and the internet of things have revolutionized the way we connect, communicate, and access information. Virtually every field has been impacted by digitization, leading to new modes of interaction and collaboration.

In the medical and dental fields, the digital era has led to advancements such as enhanced diagnostic methods, quicker and more accurate medical records, and even robotic surgery. These developments have improved patient care by providing doctors with precise diagnostic data and the ability to act swiftly. Patients now have greater access to their health and dental records, empowering them to be more informed and engaged in their own care.

Digital dentistry is an expanding field within dentistry that utilizes modern technology to enhance the precision, effectiveness, and patient comfort of dental procedures. Technologies like digital X-rays, 3D imaging, CAD/ CAM, intraoral scanning, and robotic dentistry have transformed traditional dentistry. They enable faster and more accurate diagnosis, improved treatment planning, and better patient outcomes. Digital dentistry also contributes to patient comfort by reducing radiation exposure and minimizing invasive procedures.

The utilization of intra-oral scanners in dental practices has enhanced the patient experience and streamlined the process of creating impression models. This technology offers a more reliable and consistent method, reducing the likelihood of complications that might occur with traditional tray-based impressions. As a result, any potential issues can be effectively addressed, leading to improved outcomes. (1)

DEVELOPMENT AND ADVENT:

Impression-making methods and materials have been utilized by dentists since the 18th century, but their reliability, patient comfort, and efficiency have posed challenges. To overcome these limitations, intraoral digital scanners have been developed as an alternative to traditional impressions.

The introduction of intraoral scanners has coincided with advancements in CAD/CAM technology, providing significant advantages for dental practitioners. In the 1970s, Dr. Francois Duret pioneered the concept of computer-aided design/computer-aided manufacturing (CAD/CAM) in dental applications. By 1985, the first commercially available intraoral scanner was introduced, enabling precise restorations to be fabricated by labs. This marked a significant milestone in dentistry, offering a digital alternative to conventional impressions.

Although the early scanners of the 1980s differ considerably from modern versions, digital technology has continually evolved, resulting in smaller, faster, and more accurate scanners.

The idea of creating models through impressions, which could be used to construct appliances, dates back to the early 18th century. However, it wasn't until 1856 that Dr. Charles Stent perfected an impression material, different from beeswax or plaster of Paris, to correct oral deformities. These earlier materials had issues with distortion or difficulty of use for creating oral prosthetics. (2) In 1937, Sears introduced agar as an impression material for crown preparations, and since then, elastomeric impressions and gypsum models have been widely used. (3)

In 1965, ESPE, GmbH introduced Impregum™, the first elastomeric material specifically designed for dental impression-making. Over the 77 years of using elastic impression materials, various formulations have been developed, each with its shortcomings in achieving precise reproduction of oral structures. Condensation cure silicone impression materials were later developed but faced challenges with dimensional accuracy.

Addition silicone vinyl poly siloxane impression materials resolved the issues of dimensional inaccuracy, taste and odour problems, and high modulus of elasticity. These materials offered excellent tear strength, superior flow ability, and distortion resistance even if models were not poured quickly.

Despite the advancements in digital scanning technologies, some dentists are hesitant to adopt them, believing that traditional elastomeric impression materials and techniques are irreplaceable. However, digital scanning systems have been introduced since the mid-1980s and have significantly evolved.

Intraoral digital scanners emerged alongside Computer-Aided Design and Manufacturing (CAD/CAM) technology, with the introduction of Chairside Economical Restoration of Esthetic Ceramics (CEREC) in 1984. The CEREC system was further developed over the years, and other digital scanning systems, like Ortho CAD*, Lava™ Chairside Oral Scanner (C.O.S.), iTero*, and E4D Dentist, were introduced by various companies.

Align Technology acquired Cadent, allowing clinicians to submit 3D digital scans for Invisalign appliances. In October 2012, 3M ESPE introduced the True Definition* scanner, which enabled orthodontists to submit digital scans for Incognito* custom lingual braces. The popularity of intraoral digital scanners has been growing, but questions remain about their applications and differences among manufacturers.

Currently, intraoral scanners and CAD/CAM technology offer numerous benefits, including simplified treatment planning, streamlined workflows, reduced learning curves, improved case acceptance, enhanced accuracy, and expanded treatment possibilities. Consequently, an increasing number of dental practices recognize the importance of embracing digital technologies as the future of dentistry.(4,5,6)

SCANNING TECHNOLOGIES:

Digital intraoral scanners are Class I medical electrical equipment that were created and built in line with ANSI/IEC 60601-1 specifications. (7)

There are 3 main parts of a scanner-

1. A portable camera wand to gather and scan data in the patient's mouth

2. A computer monitor to write prescriptions, approve scans and review digital files
3. A wireless workstation to facilitate data entry

All cameras require the projection of light. (8) This is then recorded as individual photos or video and assembled by the software after the POI (points of interest) are recognised. Energy from either laser light or white light is projected from the wand onto an item and reflected back to a sensor or camera within the wand to collect surface data points. The image evaluates the first two coordinates (x and y) of each point, and the third coordinate (z) is then determined based on the distance to object technologies of each camera. Tens of thousands or perhaps hundreds of thousands of measurements are made every inch according to algorithms, producing a 3D model of the object's geometry. (13)

There is a distinct difference between passive and active strategies in the field of 3D reconstruction. Passive approaches rely on an object's texture and employ only ambient lighting to illuminate intraoral tissues. Active approaches use white, red, or blue structured lights projected from the camera onto the object for reconstruction, which is less dependent on the true texture and colour of tissues. (9, 10)

In active approaches, a bright luminous point is projected onto an object, and the distance to the object is computed via triangulation. Different light patterns, such as line or mesh projections, is an alternative. Surface reconstruction can be accomplished using image compilation, video capture at several frames per second in a continuous data flow, or per wave analysis. (11, 12)

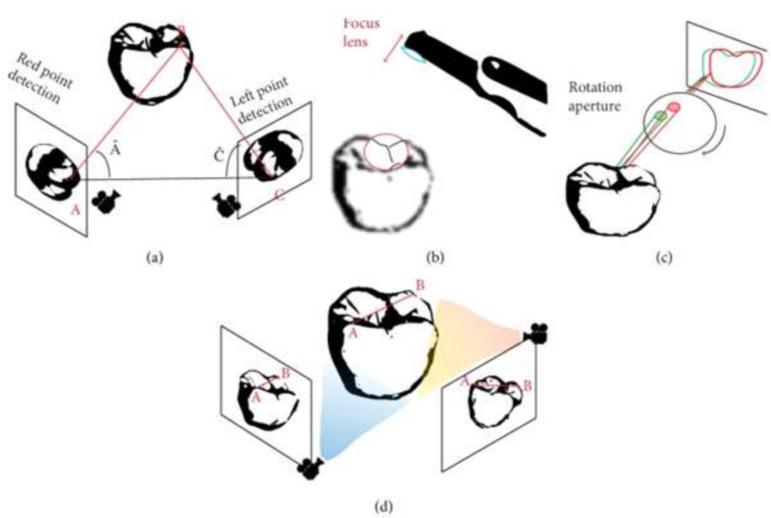
The scanner's measurement speed, resolution, and accuracy depend on the technology utilised by the wand to collect surface data.

CURRENTLY, 4 DIFFERENT TYPES OF IMAGING TECHNOLOGY ARE USED:

- TRIANGULATION
- PARALLEL CONFOCAL IMAGING
- ACTIVE WAVEFRONT SAMPLING
- STEREOPHOTOGRAMMETRY

TRIANGULATION

The foundation of triangulation is the idea that an object's position may be determined by knowing the positions and angles of two points of view. These two points of view could have been created by two detectors, one detector utilising a prism, or they could have been recorded at two distinct times.



Determining distance to the object. (a) Triangulation: distance BC could be determined according to the formula BC=AC×sin(Â)/sin(Â+Ĉ). (b) Confocal: distance to the object is determined according to the focal distance. (c) AWS requiring a camera and an off-axis that moves on a circular path around the optical axis and produces a rotation of interest points. (d) Stereophotogrammetry is a technology that generates files by algorithm analyzing numerous pictures.[13]

PARALLEL CONFOCAL IMAGING

Marvin Minsky, a researcher at Harvard University, first developed the idea of confocal in 1957. [18]. This technique can identify the sharpness region of the image to determine the object's distance, which is connected to the lens's focal length. Then, using sequential photos taken at various focuses, aperture settings, and angles all around the subject, a tooth can be recreated. The operator's dexterity in generating motion blur directly affects the clarity of the image. This technology also calls for large lenses, which could make it challenging to use in clinical settings. [4]

ACTIVE WAVEFRONT SAMPLING

Instead of employing a laser to collect data on the surface topography, a succession of camera shots with a rotating off-axis aperture scan are used, much like when making a film, and the 3D image is immediately shown on the screen. The lens quickly projects the image that the tooth reflects onto the sensor. When an object is in focus, its distance matches the focal length of the lens. However, when an object is out of focus, the distance between the lens and the object is automatically determined from the blurring picture size using a straightforward mathematical formula. [23] Compared to approaches using triangulation or laser, which gather 3D data by computing distorted patterns when lasers or light sources are reflected from objects, this method has the advantage of faster processing speed and less optical illusion. [24]

STEREOPHOTOGRAMMETRY

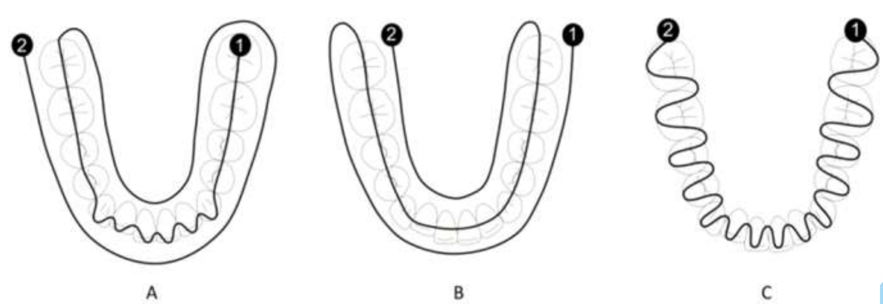
All coordinates (x, y, and z) in stereophotogrammetry are merely estimated using an algorithmic examination of the photos. The camera is relatively small, handling is simpler, and manufacturing costs are lower because this method relies on software and passive light projection rather than active projection and hardware. (13)

EFFECT OF SCANNING STRATEGIES: (14)

The precision of the digital model is dependent on the scan's beginning position, as shown by Anh et al. in their study (15). The vertical rotation of the IOS should be avoided, according to Oh et al. (16). Multiple IOS systems were examined by Medina et al. (17) and Passos et al. (18), who discovered that the scan approach has a distinct impact on IOS accuracy depending on how the data is captured. The ideal scanning technique in maxillary edentulous instances may depend on the surface characteristics and the presence of palatal rugae.

All scanning technologies combine or "stitch" a number of photos obtained from various angles to build a three-dimensional (3D) model (19). The scan strategy and the picture stitching software are tightly coupled; if the scanner moves too quickly or changes direction dramatically, the stitching process may be hampered (20,21).

Nikolas et al tested the scanning accuracy, ie, trueness and precision and analysed how the strategy affected the digital impression. Two alternatives-one with moderate changes in the IOS head direction in accordance with the manufacturer's instructions and the other with constant modifications-were tried.



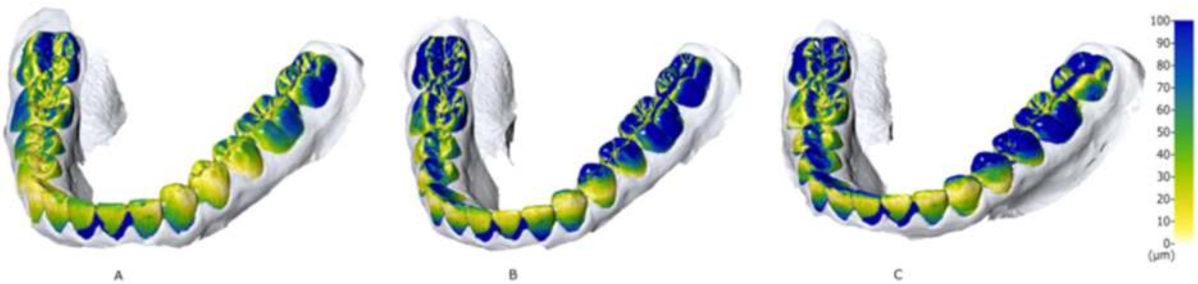
(A) Scanning strategy A. (B) Scanning strategy B. (C) Scanning strategy C. The scan starts at point 1 and proceeds with a continuous movement to point 2. (14)

In the manufacturer-recommended scanning method A, the scan was continuous and began at the occlusal surface of the lower left posterior teeth, moved along the anterior teeth in an alternating labio-lingual motion, and terminated at the lower right posterior teeth. The lingual and labial surfaces' impressions were used to finish the scan (Figure 1A).

In scanning technique B, the scan was carried out in a single, continuous motion. From left to right, it started at the buccal surface and moved on to the occlusal surfaces and subsequently the lingual (Figure 1B).

The scan in strategy C was carried out continuously in a left-to-right motion from the labial to the lingual region (Figure 1C).

The mean trueness values of the IOS were 37.5 (±12.5) µm, 44.8 (±17.3) µm, and 43.9 (±20.0) µm, for scanning strategies A, B, and C, respectively.



*Representative superimpositions for each scanning strategy (**A**–**C**). The color-map indicates the trueness of Medit i500. Premolars and molars of the lower left quadrant presented inferior trueness, probably because this region was the scan's starting point for all strategies. Values in µm.* ***(14)***

This study's in vitro design ensured a uniform scanning environment and a large number of scans (n = 180). For checking trueness, a high precision reference scan from a lab scanner was also available. Dental casts, however, fall short of accurately simulating the clinical setting because they fail to account for factors like saliva, blood, a patient's movement, a constrained work area, moving soft tissues, pharyngeal reflexes, the translucency of the oral mucosa, lighting conditions, crowded or misaligned arches, and metal appliances with reflective surfaces (15,16,22,23,24,25,26). The substrate's reflection, refractive index, and translucency have a big impact on accuracy and precision.

This research is among the few studies that explore the influence of scan strategy on the accuracy of active triangulation intraoral scanners (IOS). Active triangulation scanners determine the object's distance based on image coordinates from two different points of view (13). Compared to confocal microscopy, active triangulation scanners are more susceptible to variations caused by different substrates (27).

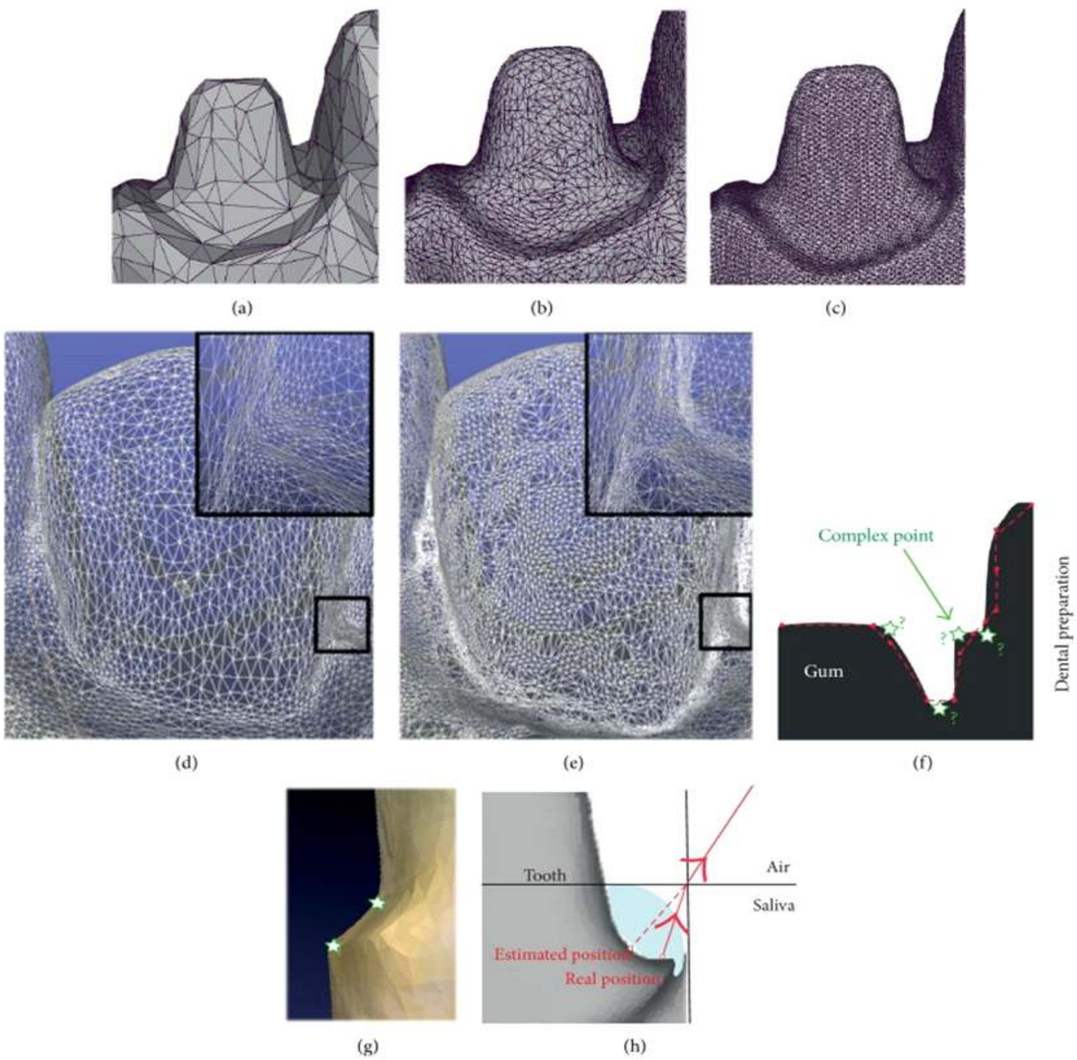
In the study conducted by Medina et al. (17), the impact of scanning strategy on the accuracy of four IOS systems was investigated. Among these systems, only the confocal IOS showed a dependence on the scanning strategy. It achieved better accuracy when a sequential strategy (similar to strategy C in our current study) was employed. However, the active triangulation IOS that was examined in this study was affected by the scanning strategy, and the sequential strategy resulted in inferior outcomes. This difference in performance could be attributed to the distinct IOS system used, including both hardware and software aspects

All scanning systems use "image stitching" algorithms to create the 3D model, but these algorithms may introduce inaccuracies, especially when surfaces to be joined lack prominent features. In scanning strategy A, which showed statistically significant improvements, the scan initiated from the occlusal surfaces of the posterior teeth, an area with complex morphology. On the other hand, scanning strategies B and C started from the buccal surface of the posterior teeth, a region with simpler morphology, potentially leading to errors during the image stitching process. A previous study (15) also observed a connection between the starting point and the accuracy of the IOS, but the starting points in that study did not involve different tooth surfaces, and the scanners used confocal microscopy principles.

In contrast, Oh et al. (16), using the same IOS and software as used by Nikolas et al (14) but employing different scanning strategies, concluded that the starting position of the scan does not impact accuracy.

The IOS's accuracy along each of the three axes (x, y, and z) has not yet been completely assessed (28). Recent research (16) emphasised the need to limit the rotations and vertical movements of the scanner head since a change in direction could interfere with the image-stitching procedure. The accuracy was much worse in approach C, where rotations predominate. Interestingly, approach B, which held the IOS primarily horizontally, similarly yielded subpar accuracy. This is consistent with the findings of Passos et al. (18), who found that the sequential technique produced noticeably worse outcomes than the primarily linear, dominating strategy. The outcomes of the sequential method, however, were comparable to those of many other linear strategies.

MESH QUALITY: (13)



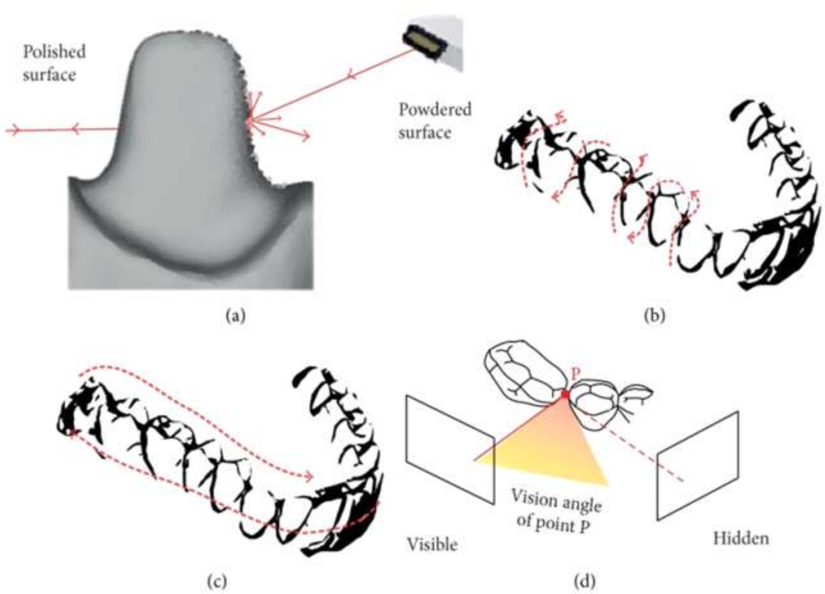
Management of mesh quality. Comparison of STL files depending on mesh density. (a) Low density. (b) Medium density. (c) High density. (d) Large number of triangles over the whole tooth. (e) Routine mesh on flat zones and denser mesh for gingival sulcus. (f) Prepared teeth present various points that are complex to scan. (g) Complex points can appear smoothed on CAD-CAM software. (h) Saliva or water film can generate errors during margin impression that could reduce mesh quality.(20)

The IOS software has the capability to generate files with different mesh densities, as illustrated in Figures 5(a), 5(b), and 5(c). However, using a high mesh density for the entire tooth is not practical due to the extensive computing time involved. Some files implement a routine mesh for flat areas (e.g., the vestibular face of incisive) and a denser mesh for regions with higher curvatures (such as the incisal edge or gingival sulcus; Figures 5(d) and 5(e)). It is essential to have an adequate number of triangles to accurately follow the emergence profile, as too few triangles may result in margin smoothing (Figures 5(f) and 5(g)). (20)

During intraoral scanning, one of the primary challenges is controlling patient movement, which can inadvertently lead to scanning of peripheral soft tissues like the tongue or jaws (20,12). Additionally, the presence of blood, saliva, or gingival fluid can also distort the acquired images (20,29). For instance, a thin film of water can cause margin impression errors of up to several millimeters (Figure 5(h)). Advanced IOS systems now offer color and texture features that significantly enhance the perception of clinical situations and dental volume.

POWDERING: (13)

Due to overexposure, dental tissues include a number of reflecting surfaces, such as polished or enamel crystals, which may interfere with the software's ability to match POI. Practitioners could alter the camera's angle to increase diffuse light to avoid this (Figure 4(a)). Utilising cameras with polarising filters is another approach some systems try to get around this problem (13, 30). In order to lower reflectivity for other scanners, a 20-40 ?m powder coating is necessary during the digitising process (Figure 4(a)). Although the powder thickness between operators could theoretically fluctuate and affect file correctness, the IOS software is capable of accounting for an average thickness (13, 31).



The accuracy of powder-based digital imprints for incomplete impressions has already been demonstrated (32,33). However, patients may find powder to be rather painful, and it has been noted that scanning times increase when saliva contaminates powder during impression, necessitating cleaning and reapplication of powder (34). Additionally, IOS employing powder-free technology appears to be advised for full-jaw scans due to the challenge of maintaining powder coating on all of the teeth for the duration of the scan (35). It was concluded that, despite the fact that powdering is not particularly comfortable for patients, there was no discernible difference in the articles that looked at how powdering affects scan accuracy.

Scanning strategies. (a) Prepared teeth have reflective surfaces due to enamel or polished surface. Powdering can increase diffuse light that diminish this phenomenon. (b) A one-way scan (S sweep on vestibular, occlusal, and lingual surfaces). (c) A linear movement on occlusal-palatal surfaces followed by buccal surface. (d) Proximal faces are hidden if the scanning strategy is not adapted. (13)

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VARIOUS INTRA-ORAL SCANNERS:

TRIOS 4: (36)

The TRIOS 4, which is the fourth generation of the TRIOS scanner, builds on the features of the TRIOS 3, which was already among the swiftest scanners available. The TRIOS 4 is swift, robust, and simple to use. There are several variations available, including a POD (USB) and TRIOS MOVE, possibly the most ergonomic cart on the market. With these scanners, we can frequently do full-arch scans in less than 45 seconds. The TRIOS4 also has surface caries detection capabilities because to its integrated fluorescence technology. In contrast to 2019, a second scan is no longer vital. The variety of "Patient Engagement" Apps that come with the TRIOS scanners, including as patient monitoring, smile design, and orthodontic simulation, is another advantage. It is one of the few wireless scanners available. Although this can lead to connectivity troubles and scanning issues, overall, the wireless scanner functions well and is a fantastic quality-of-life choice. But the battery life has to be extended. The biggest advancements since 2019 have been 3Shape's announcement that they are providing a no-annual-fees option for TRIOS scanners. The second significant announcement concerned the new app-based platform 3Shape Unite.

PROS:

- Speedy and quick
- Particularly the TRIOS Move Software apps, which feature smile design and ortho simulation, are wireless and ergonomic
- Option for Free Subscription Exists
- One of the most effective CAD programmes available, although it is expensive and requires a subscription.

CONS:

- Expensive
- The CAD/CAM software requires a number of pricey subscriptions.
- It uses third-party milling machines for same-day dentistry.

2. DENTSPLY SIRONA PRIMESCAN: (36)

It is one of the fastest scanners available, if not the fastest. Excellent AI provides a smooth and efficient scanning experience. Although the scanner is substantially bigger than the Omnicam of the previous version, this often does not provide a significant scanning problem. It is larger, heavier, and has a wider field of view than any other scanner, thus even while held still, it captures more data than other scanners do, thus, balancing out the size. The Primescan is only available in cart form. It is not portable, although it is moveable in between surgeries. Therefore, it is not practical to transfer the Primescan between appointments or outside the clinic. There are two versions of the Primescan: one that includes the CEREC Software for CAD design (Primescan AC with CEREC Software) and one that only offers the scanner for scan and send to lab operations (Primescan AC with Connect Software).

A scanner-only option has probably had limited success in reaching dentists who do not wish to perform CAD/CAM chairside workflows for single-visit dentistry, especially in light of the less expensive intraoral scanner options. The company focuses on CAD/CAM and same-day dentistry. In comparison to any other system or combination now on the market, it provides the finest same-day workflow when used in conjunction with a CEREC Primemill, milling machine, and CEREC SpeedFire furnace. The majority of technological advances over time have been made in CAD software, with the scanner only having a small number of software options, such a grin design programme. For instance, the CEREC Software does not have additional apps featured in the rivals, such as caries diagnosis, orthodontic simulation, model builder, etc.

The CEREC chairside system also has several restrictions, such as the inability to import scans from other IOS devices or export models for printing.

PROS:

- Rapid scanning
- For single-visit dentistry, incredible AI has unmatched CAD/CAM workflow The benchmark for companies offering same-day indirect restorations Although there is a subscription-free option, it is generally not advised.

CONS:

- Although not essential, an expensive CEREC-Club membership is needed for software updates.
- Other than a smile design feature, there are no apps for caries detection or scanners.

3. MEDIT i700: (36)

The Medit i700 scanner is incredibly quick and fluid, outperforming several features of the Medit i500 from the previous generation. It offers a scanning experience that is comparable to some of the best scanners available yet costs a small fraction of the price.

With a weight of just 245 g, it is among the lightest scanners available. It is also one of the few USB scanners that can be used without a power cord by using USB C, which has a significant positive impact on quality of life by reducing clutter and cords.

The Medit i700 is solely a scanner. This scanner lacks the CAD software of the aforementioned scanners, which all have them. It does, however, include some of the top software applications available for scanners in general. The software includes several excellent free apps, including Medit Smile Design, Compare, CrownFit Checker, Orthodontic Simulator, Model Builder, and most recently Medit Temporaries. After 2019, the software underwent an expeditious change. New features are constantly being added by the Medit team. There is always room for improvement, and new additions are made each month An online connection is necessary for the scanner to function. Although the scanner has an offline mode, it can only be used offline for 44 days before requiring an internet connection. For people who might not have access to reliable internet connections, this is an important point to understand.

PROS:

- Fast scanner
- Inexpensive
- Strong software and applications for scanning
- Subscription-free

CONS:

- Has to be connected to the internet to function
- No requirement for CAD/CAM software; third-party mills and software are essential for same-day dentistry.

4. ALIGN iTERO ELEMENT 5D PLUS: (36)

A notably better user experience is the outcome of significant advances to the computer's internal workings. Any other iTero scanner on the market is substantially slower than the Element 5D Plus. The scanner's size and ergonomics continue to be major flaws.

. It is still huge, heavy, and extremely unwieldy to use in comparison to the Element 5D generation. This scanner is one of the heaviest intraoral scanners on the market, weighing about 500 g, more than twice as much as some other scanners. The ideal scanner for clinics that specialise in Invisalign is the Element 5D Plus. This is due to the fact that Invisalign has blocked access to all of the other most recent scanners on this list. The Invisalign Outcome Simulator, another feature of the Element 5D Plus, is undoubtedly the best ortho simulation tool available in any scanner.

A fresh auto-upload feature for the Element 5D/5D Plus was recently announced by Align. With the ability to use intraoral scan pictures rather than the customary intraoral photos, this new auto-upload capability will speed the submission of Invisalign cases.

The Element 5D Plus uses Near-Infrared Imaging (NIRI) for its caries detecting capabilities. As it concurrently records 3D, intraoral colour, and near-infrared images (NIRI) in one scan, the imaging technology is amazing. The only scanner that can obtain all of this data in a single scan.

For CAD/CAM practises, iTero scanners can also be coupled with exocad.

PROS:

- Quick scanner
- The top orthodontic simulator available
- Perhaps the greatest technology for detecting caries
- Invisalign's preferred scanner

CONS:

- Cost-prohibitive scanner with a hefty yearly subscription
- Massive and heavy
- Reusable scanner heads
- Exocad cannot currently be integrated with any CAD software.
- There are no other widely used scanner apps save the orthodontic simulator

5. CARESTREAM CS 3700: (20,36)

In the currently cutthroat market, the CS 3700 is another excellent intraoral scanner. The majority of contemporary scanners offer fast scan times. The CS 3700 is simple to operate and boasts speed that is above average. It performs far better than its predecessor, the CS 3600, although not being the quickest on the market. Full arch scans may be completed using the CS 3700 in about 60 seconds, which is quickly becoming the industry standard. The CS 3700 fills the 'premium' void but is not faster than the TRIOS 4 or CEREC Primescan.

Additionally, the CS 3700's software has great AI that is quick to reposition itself after pausing and restarting the scan.
When integrating the two arches in a single scan, as the CS 3700 excelled at doing, this AI is quite outstanding. Overall, the scanning process is seamless. The CS 3700 is portable, well-made, and simple to use. One of the smallest scanners available is the scanner itself. Three distinct scanner heads are included with it: a Normal Tip (also known as the posterior tip), a Side Tip (rectangular field of view), and a Paediatric Tip for youngsters, patients with limited mouth opening, or patients with TMJ disorders. CS 3700 is 316g in weight. This weighs less than the TRIOS 4 (340g), CEREC Primescan (457-525g), or iTero Element 5D (about 500g) and is slightly heavier than the Medit i700 (245g), approximately the same as a CEREC Omnicam (315g), and about as heavy as a CEREC Primescan.

One of the scanner's standout characteristics is its remarkable shade-matching capabilities.

The system's brain is the CS ScanFlow software. Despite having a model building option, this application is not intended to be used for 'patient motivation' or other applications like grin design. The software offers a basic set of tools for manipulating and analysing scans.

We tested the CS Model+ Version 4 Software along with the CS 3700 scanner throughout this test. Planning and simulations for orthodontic treatment use this programme. It costs extra and can be put on up to five stations. Simply expressed, we considered the programme to be highly complex and unlikely to be used by the typical dentist.

PROS:

- Adequate speed
- Great tools for matching shades
- Includes model builder software.

CONS:

- Software is now behind its rivals
- Tools for basic scan analysis and manipulation
- No applications for patient motivation Comparatively pricey for a scanner-only product without CAD

6. PLANMECA EMERALD S: (36)

2019 saw the introduction of Romexis 6.0 by Planmeca, which provided the software and UI upgrade that was direly needed. This new software performs a great deal better than the old one.The Emerald S's exceptional lightness is one of its distinguishing qualities. This scanner weighs 235 g, which is less than the TRIOS and CEREC models. It is the only business, aside from Dentsply Sirona, that provides the whole chairside CAD/CAM workflow, which includes manufacturing a milling machine, scanner, and CAD software. As a result, Planmeca provides a less expensive option for people looking for a substitute for the CEREC workflow. Although the software is adequate, it does have certain restrictions, such as the inability to simultaneously create opposing restorations.For the most part, it is a respectable, if not necessarily superior, substitute to CEREC for same-day dentistry.

PROS:

- Quick scanner
- Totally without a membership
- Compared to CEREC, a more inexpensive full CAD/CAM package
- Reasonable CAD/CAM workflow, but with some restrictions

CONS:

- The application is now behind its rivals.
- The software applications are modest and constrained
- Limited materials for the Planmeca mills than for CEREC

7. 3MESPE LAVA COS: (37)

Contrary to the point-and-click technique now in use, 3D-in-Motion enables the Lava C.O.S. to take continuous 3D video images, creating a digital impression that is used to construct an exact-fitting restoration. This technology allows the Lava C.O.S. wand to capture 20 3D data sets per second in continuous operation.

The Lava C.O.S. introduces a whole new technique for gathering 3D data. The 3Din-Motion technology models the 3D data in real time while it is being captured in a video sequence. As a result, the Lava C.O.S. can scan accurately and quickly at a rate of about 20 3D data sets per second, or almost 2,400 data sets per arch.

The Lava C.O.S. wand's tip is only 13.2 millimetres wide and weighs only 397g, allowing for simple movement and clearance inside the mouth.

Other conventional point-and-click technologies rely on the twisting of a laser or light pattern on an object to determine 3D data. Unlike video imaging, point-and-click uses individual "snapshots" to construct a model.

The Lava C.O.S. simultaneously shows the touch screen monitor with the photos being taken in the mouth. A dentist can reliably and quickly determine whether enough data has been collected for a full digital impression with this real-time visibility.

PROS:

- The same cutting-edge equipment is available to dentists and labs to verify the preparation and margin, including video viewing, 2D enhancement, and 3D stereographic examination. Labs can safely mark the margin since they know they are viewing the exact same photos as the dentist.

PROS:

- Flexibility- the Lava C.O.S. is the entry point to traditional processes like PFM, or CAD/CAM processes, including Lava™ Restorations.

8. STRAUMANN VIRTUO-VIVO INTRA-ORAL SCANNER:(38)

It is one of the lightest scanners on the market and has a cylindrical design. The scanner weighs about 130 g. Given that it fits well in the user's hand, it is generally a comfortable iOS to use.

The scanner is 281 mm 33 mm 46 mm in exact measurements. The intraoral scanner is not only compact but also lightweight. with general, patients feel more at ease with smaller scanners.

In conclusion, based on the study and tests conducted, the Vivo's accuracy was estimated to be around 40 microns. This is typical and a respectable level of accuracy for iOS devices. Take into account that the accuracy of silicone impression material is roughly 37 microns. Thus, although being almost five years old, the Virtuo Vivo is still a functional and reliable scanner.

CONCLUSION:

In conclusion, this review article has underscored the profound significance of intraoral scanning in dentistry in the present day and age. With remarkable advancements in digital technology, intraoral scanners have revolutionized dental practice, offering numerous advantages over traditional impression techniques. The adoption of intraoral scanning has ushered in a new era of precision, efficiency, and patient comfort in dental procedures.

The key benefits of intraoral scanning lie in its ability to capture highly accurate and detailed 3D images of the oral cavity, enabling more precise diagnoses, treatment planning, and restoration designs. By eliminating the discomfort and inconvenience associated with traditional impressions, intraoral scanning has significantly enhanced the patient experience, promoting better compliance and overall satisfaction.

Moreover, the seamless integration of intraoral scanners with computer-aided design and manufacturing (CAD/CAM) systems has streamlined workflows, reducing the chairside time and enhancing the overall efficiency of dental practices. This not only optimizes the use of valuable resources but also allows for quicker turnaround times, which is crucial for time-sensitive treatments.

Furthermore, intraoral scanning has played a pivotal role in fostering interdisciplinary collaboration among dental specialists. The ease of data sharing and communication facilitated by digital records has resulted in more cohesive treatment planning and improved patient outcomes.

As with any technology, challenges remain, such as initial investment costs and a learning curve for some dental professionals. However, it is evident that the long-term benefits far outweigh these challenges. Intraoral scanning has firmly established itself as a cornerstone of modern dental practice and is continually evolving, promising even more exciting possibilities in the future.

Thus, intraoral scanning has become a game-changer in contemporary dentistry, bringing forth a new level of precision, efficiency, and patient-centric care. Embracing this technology not only elevates the standards of dental practice but also reinforces the commitment of dental professionals to deliver the best possible care to their patients. As the field of digital dentistry continues to advance, the future holds great promise for further integration and refinement of intraoral scanning technologies, ultimately leading to enhanced oral health outcomes and improved overall well-being for patients worldwide.

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EVERYDAY DIGITAL DENTISTRY MADE EASY... A SIMPLE CASE TO PROLONG THE LIFE OF A FAILING TOOTH.

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BDS (Birm.) Dip Imp Dent RCS Ed. MFGDP RCS Eng.
Global Digital Dentistry Influencer

I am and I enjoy being a general dentist every day. Having qualified 22 years ago, I have practised digital dentistry for 20 of those years and here is an example of how I use it in my daily work.

A regular client of mine attended for a routine examination. As part of that I noticed that her lower right right first molar had numerous cracks visible on the surface. Routine radiographic examination of this area showed that the tooth in question was previously restored with composite, but beneath, it was clear to that there was some metallic material left behind. This was important because the patient has a congenitally missing premolar and therefore the first molar is occlusally overloaded.

I agreed with the patient that we would dismantle this restoration and place an indirect restoration using a single visit technique. Here are the steps that I took 2 provide this restoration in a single visit.

Treatment was provided under an ID nerve block. Whilst that was working, the opposing arch, the working arch and the bite registration were scanned. I only scanned quadrants because more data was not required.

I then cut out the pre-op situation from the intraoral data so that the prepared tooth data could be scanned into place and merged.


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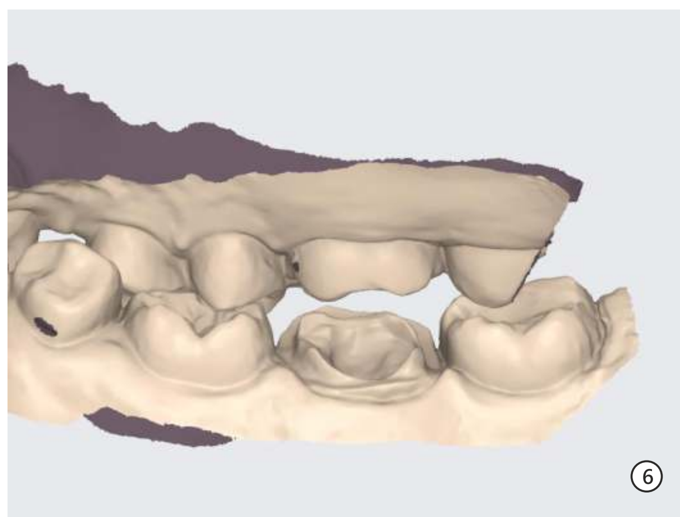
6

Having worked closely with dental material manufacturers I know there are few materials in cosmetic and adhesive dentistry that will provide longevity and superior aesthetics if the preparation technique is anything less than ideal. As you can see, in this case and in the vast majority of my cases I placed a clearly defined shoulder margin all of the way around the preparation.

The case data is exported to a known location and then imported into my CAD software. With the patient sat beside me I can then mark my margin which is clear to see because I myself have just placed it. I make it easy to find this margin by carefully managing soft tissues and moisture control with my assistant before scanning. I then choose my path of insertion and then use a digital library to propose an initial design.

The initial design is then tailored using CAD software tools to customise the restoration for this case. In the images below you see with that we chose to place an onlay restoration having removed all of the offending materials including the lining. That means that my restoration will be very closely bonded directly to tooth material. Many studies show that the highest bond strength is achieved directly to tooth and not to any third-party material which is why I choose not to place a core of any sort.

In this case my material of choice was an engineered feldspar that I've been using successfully since 2004. The design was nested, transferred to my milling machine and produced in around 15 to 20 minutes, whilst the patient eagerly watched the machine working.

The completed product was then etched and silanated by my assistant ready to be placed. No temporary restoration of any sort was required. The onlay was fitted with a dual-cured resin luting cement, adjusted for occlusion and then polished in the mouth using a five-step polishing process.

This patient had a successful restoration in a single visit that took around 90 minutes to complete and required no second visit which is important given that she travels for almost one hour by car to come to see me.

So, the end result is a success for both the patient and me. It shows the technology available in dentistry to our patients as well as keeping team members involved in our daily work and my mind busy in design, preparation, production and fitting of another successful restoration.

NEW TECHNOLOGY OVERVIEW SECTION

RAYFace FACIAL SCANNER: A NEW TOY OR A GAME CHANGER?

DR NIRAJ KINARIWALA, BDS, MDS, PhD (Fellow)

Head of Department, Center of Dental Excellence, Karnavati University, Gujarat, India. He is an Adjunct Professor at Universitas Airlangga, Government Dental College, Indonesia. He is owner of White Dental Lounge, Ahmedabad. He is Editor-in-Chief and co-Author of the book, Guided Endodontics, from Springer Publishing House. He is the only Editor from India in a renowned journal of FDI, International Dental Journal. He is a passionate proponent of magnification and digital dentistry.

The continuous advancement of digital technolo- gies has led to major innovations in dental techniques and workflows. The use of intraoral scanners and CAD/CAM technology for the restoratio of teeth and dental implants has become common-place. More recently, facial scanners have found a foothold in the digital dental workflow. This technolog uses optical scanning techniques to digitally capture and present a detailed three dimensional representa-tion of a subject's face and head. Subsequently, the data can be utilized for a multitude of analyses includ-ing patient treatment planning, diagnosis, and commu-nication. RAYFace is a facial scanner introduced by a Korean company Ray. RAYFace uses six high-resolutio cameras and an inbuilt ring light to take a facial scan. These cameras operate simultaneously to accurately capture the depth of the subject to instantly create realistic 3D data. The most superior aspect of the RAYFace compared to other face scanning technolog is the fact you can take a facial scan within 1-2 second..

It uses patient's face to create a virtual avatar, resulting in a precise outcome tailored to individual's unique needs. Powered by artificial intelligence (AI), intraoral scans and CT data automatically align individual's face, which we refer to as a "Dental Avtar", creating a 3D virtual patient analysed using cutting-edge facially driven technology for aesthetic and smile design. Unique selling points of these products are enlisted as follows:

LIGHTNING-FAST SINGLE-SHOT SCANNING

RAYFace has cutting-edge technology which scans patient's dental structure in just 0.05 seconds, providing a quick and efficient process that saves dental professionals and patients time.

3D FACIAL SCAN

RAYFace captures a 3D scan of your face, providing dental professionals with a detailed and accurate representation of your dental structure, allowing for more precise diagnosis and treatments.

FACE-DRIVEN TREATMENT

RAYFace enables dental professionals to diagnose dental problems that fit the patient's face, resulting in more natural-looking and aesthetically pleasing treatment outcomes
Communication. RAYFace's technology allows for convenient communication between dental professionals, patients, and laboratories, ensuring a smooth and efficient treatment process with collaboration among professionals to provide the best possible care and treatment.

FACE-CENTERED TREATMENT

RAYFace uses a unique approach to dental treatment that focuses on creating a natural balance between your facial features and teeth, resulting in a personalized and natural-looking smile

AUTO-ALIGNMENT

RAYFace uses advanced AI technology to automatically align your virtual patient, creating a 3D virtual patient analyzed using cutting-edge facially driven technology for aesthetic and smile design.

TRUE DIGITAL BITE

RAYFace provides a more precise analysis of your occlusions than today's digital bite technology, resulting in more accurate and effective treatment.

ISDD ACTIVITIES

DIGITAL DENTISTS ESTABLISH NATIONAL ORGANIZATION

AN INITIATIVE BY PROFESSIONALS TO CREATE AWARENESS ABOUT FUTURISTIC DIGITAL DENTISTRY

Inauguration of the Indian Society of Digital Dentistry Conference by Hon. Shree Chandrakant Dada Patil- Minister for Higher and Technical Education for Government of Maharashtra

Launch of the Indian Society of Digital Dentistry App by Hon. Dr Bharti Tai Pawar Minister of state for Health and Family Welfare, Government of India

PUNE: 18th Nov to 22nd Nov 2022

In an iconic move towards futuristic dentistry, eminent clinicians across the country came together to establish this Indian society of digital dentistry. This initiative is infused to create awareness about futuristic digital dentistry.

The world is observing drastic digital revolution. This revolution has positively affected the medical professionals. With the help of computers and other digital devices labour intensive operations are made simple, quick, and more dependable. In dentistry, digital technologies are evolving significantly. Cone beam computed tomography (CBCT), desktop, intraoral, and face scanners, CAD/CAM software, and fabrication techniques like milling and 3D printing are transforming the way dentists treat their patients. To create awareness about these technologies and make dentistry more accurate, effective, and affordable this new organization ISDD has been formally established.

Connecting dental professionals who are passionate about digital dentistry, increasing awareness of the benefits of digital dentistry, imparting skills about changing dental procedures and increasing patient -practitioner satisfaction.

ISDD ACTIVITIES

THE "VISUAL IDENTITY" DIGITAL LIKE PRO COURSE WAS CONDUCTED BY MILADINOV MILOS ON 23-25 MAY 2023 IN PUNE.

The "Visual Identity" Digital like PRO course was conducted by MIladinov Milos on 23-25 May 2023 in Pune.

A 3 day action packed Hands-on course specially created for dentists & dental technicians with focus on

- **Dental photography**
- **Keynote in dentistry**
- **Full digital workflow**

It was conducted for the first time in India. The participants learned to make beautiful photos & portrait shots of patients & their dental work; present them uniquely with the help of Keynote; content creation for social media and 1 day live patient digital workflow for scanning, planning, documentation to 3D printing.

Here's what our international delegates from Germany had to say -

Dr Barbara: Very good course. I would recommend it to all. Good concept for digital marketing & digital dentistry

Dr Elina B: Got all my questions answered. I liked it very much & look forward to using everything we learned at the course.

Thank you ISDD - great course