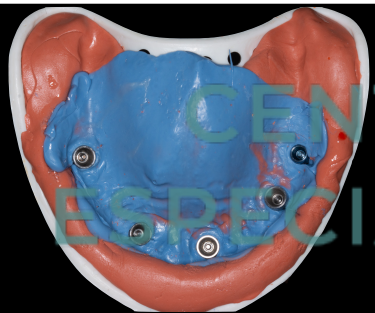
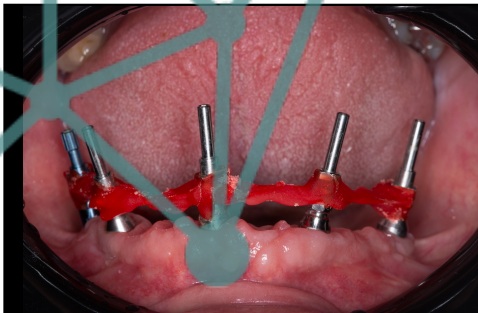


Planificación y carga inmediata Para Arcos completos



Cirujano Dentista Universidad de Concepción
Especialista en Implantología, UdeC
Especialista en Prótesis Fija, Removable e Implantología, UNC
Magister en Educación Superior en ciencia de la Salud, USS
Diplomado en Cirugía Plástica Periodontal e Implantológica, UdeC
Pasantía NYU Dentistry, Implantología Digital
Diplomado en Estrategias de Enseñanza Digital, USS
Director Clínico, Clínica Dental Plaza
Docente Pregrado USS
Docente Postgrado, Especialidad en Rehabilitación Oral, USS
Docente Postgrado, Diplomado en Implantología Quirúrgica
Docente Postgrado, Diplomado en Rehabilitación Oral Estética
Director Study Club Concepción ITI
Miembro ITI
Secretario Sproch Filial Concepción
Exvicepresidente Sproch Filial Concepción



¿Podemos eliminar la impresión convencional de
nuestra práctica en implantología?



Aquí empieza todo....



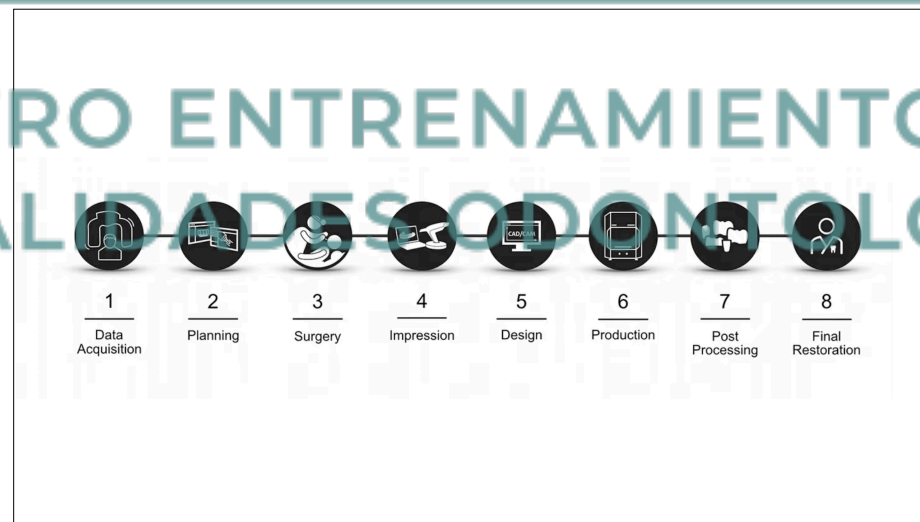
Los pacientes completamente edéntulos se benefician sustancialmente cuando al menos la mandíbula se restaura utilizando un CIFDP o un IOD en comparación con CD. En pacientes completamente edéntulos, las prótesis sobre implantes son la mejor opción para el reemplazo dentario. La disponibilidad de esta modalidad de tratamiento debe promoverse activamente en todas las comunidades edéntulas, incluidas aquellas con acceso y medios limitados.



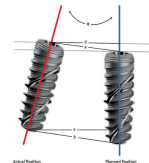
DR.
JAVIER
FIGUEROA
IMPLANTOLOGÍA Y REHABILITACIÓN ORAL

Work Flow

Implantología Digital



Precisión de Cirugía Guiada



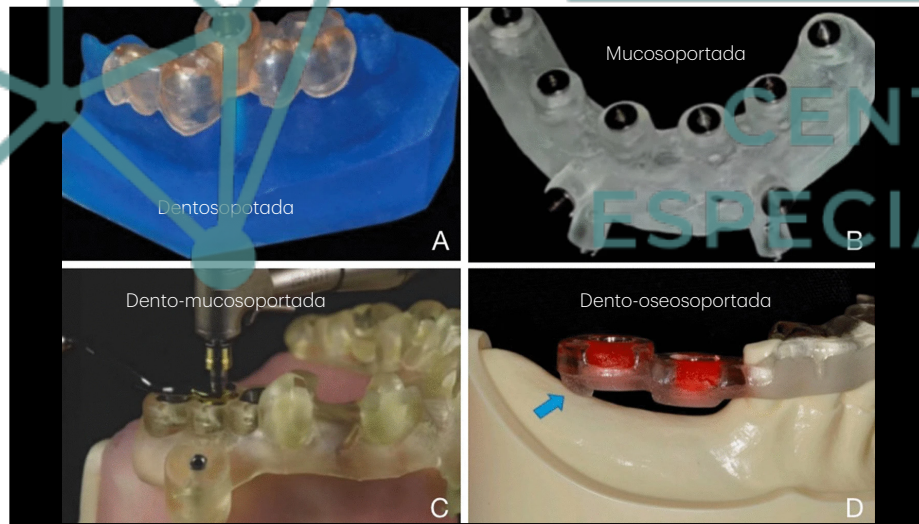
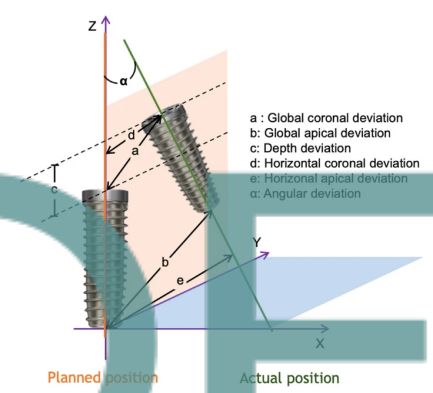
	PG Group			FG Group		
	Mean	±Standard Deviation	95% CI	Mean	±Standard Deviation	95% CI
Angular (degrees)	4.73 ±1.59	3.59 - 5.87	4.01 ±2.48	2.23 - 5.78		
Depth (mm)	0.95 ±0.59	0.5 - 1.41	0.48 ±0.29	0.25 - 0.71		
Global apical (mm)	2.25 ±0.59	1.82 - 2.67	1.52 ±0.89	0.87 ±2.16		
Global coronal (mm)	1.38 ±0.46	1.05 - 1.71	1.04 ±0.63	0.59 - 1.50		
Lateral apical (mm)	1.94 ±0.94	1.26 - 2.62	1.25 ±1.03	0.50 - 1.9		
Lateral coronal (mm)	0.96 ±0.55	0.56 - 1.35	0.75 ±0.52	0.38 - 1.13		

CI, confidence interval; DICOM, digital imaging communications in medicine; FG, fully guided; PG, partially guided. Statistical difference observed between groups: * $p < 0.05$; ** $p < 0.01$.

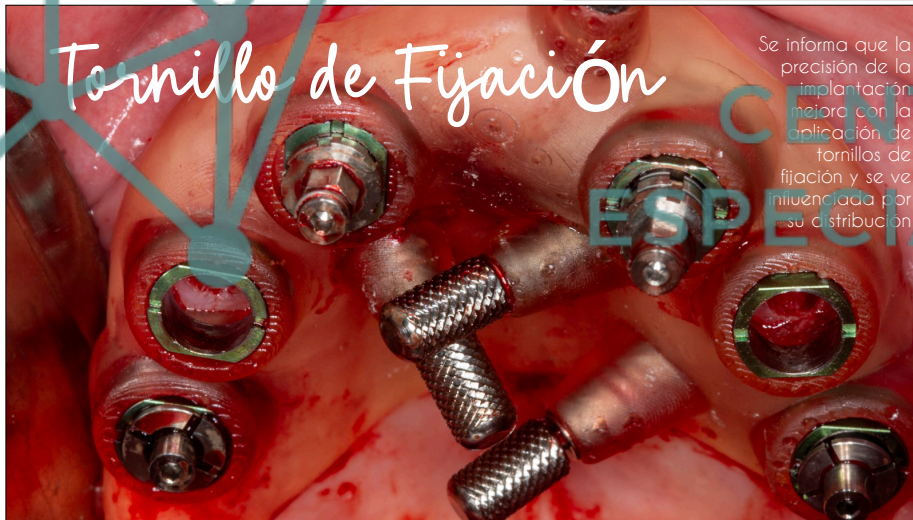
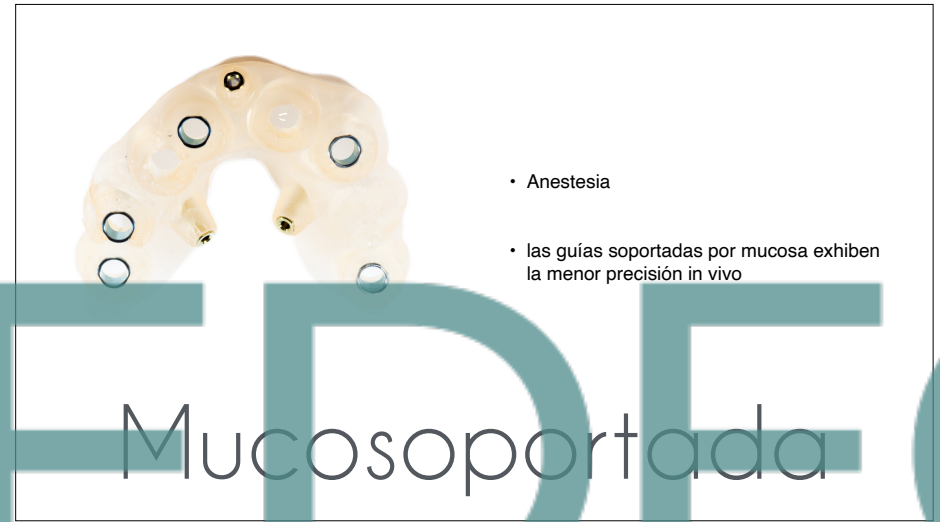
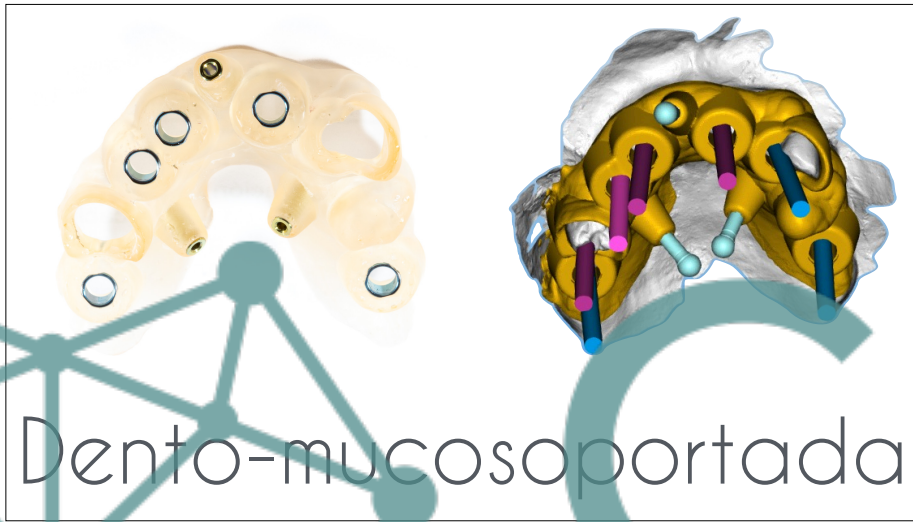
A systematic review of the accuracy of digital surgical guides for dental implantation

Abstract
Purpose: This review aimed to assess the influence of implant guides on surgical accuracy with regard to supporting types, manufacturing methods and design (including fixation screws and sleeves).
Methods: A literature search related to accuracy of surgical guides for dental implantation was performed in Web of Science and PubMed. Studies with in vivo or in vitro deviation data published in recent 5 years (2018–2022) were included and assessed by Newcastle–Ottawa Scale with regard to bias of bias and reliability degree of clinical studies. Accuracy-related deviation data were summarized as forest plots and normal distributions.
Results: Forty-two articles were included with high degrees of reliability. Data showed that implant surgery accuracy can be achieved with mean distance deviation < 2 mm (most < 1 mm) and angular deviation $< 5^\circ$ (most $< 3^\circ$).
Conclusions: Patient tooth-supported guides combined highest in vitro accuracy and similar in vivo accuracy. To enhance tooth-supported guides, mucosa-supported guides exhibit lower in vivo accuracy, while in vivo data showed low reliability due to mechanical complexity of fixing mucosa tissue. While published higher in vivo accuracy of guides than 3D printing, through further data support was needed. Design of fixation screws and sleeves of implant guides showed significant accuracy variance. A review of implant guides (comprehensive of accuracy assessment standards for implantation accuracy) remained a major problem in this field. The influence of various factors on implantation accuracy remained to be investigated and high-level evidence of clinical accuracy was needed.
Keywords: Surgical guides; Guided implant surgery; Digital dentistry; Surgical accuracy; Deviation; Systematic review

Precisión de las guías quirúrgicas digitales para implantes dentales



Dentosoportada



Diseño de los Anillos

Son guía del orificio de perforación, la dirección, la profundidad y el ángulo

Abiertos o cerrados

Distancia menor del anillo al hueso conduce a resultados más precisos y que el diseño podría afectar la precisión

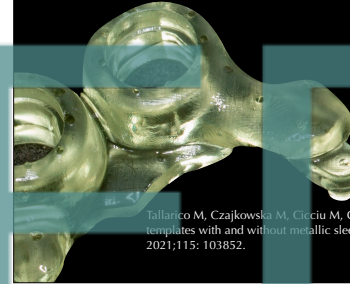
La precisión del implante se ve afectada por el diseño de la altura, la distancia de perforación y la distancia anillo-hueso

Las alturas de anillo ≤ 5 mm conducen a una desviación de la colocación del implante y una disminución de la precisión



Con o sin anillo?

Reportaron que un anillo plástico podría disminuir la desviación angular y además hacer una cirugía más fácil y menos costosa



Tallarico M, Czajkowska M, Cicciu M, Giardina F, Minciarelli A, Zadrozny L, et al. Accuracy of surgical templates with and without metallic sleeves in case of partial arch restorations: a systematic review. J Dent. 2021;115: 103852.

Manufacturing accuracy



Aditiva



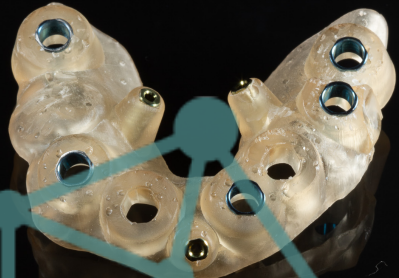
Sustractiva

Manufacturing accuracy

A pesar de las diferencias en la precisión de fabricación, las investigaciones clínicas no indicaron diferencias significativas en todos los indicadores de precisión quirúrgica entre las guías fabricadas de forma aditiva y sustractiva

Henprasert P, Dawson DV, El-Kerdani T, Song X, Couso-Queiruga E, Holloway JA. Comparison of the accuracy of implant position using surgical guides fabricated by additive and subtractive techniques. J Prosthodont. 2020;29(6):534-41.

Conclusión



Los tipos de guía, los métodos de fabricación y el diseño de las guías de implantes (incluidos los tornillos y anillos de fijación) podrían influir en la precisión de las guías quirúrgicas digitales estáticas mediante la recopilación y categorización de los datos numéricos del indicador de precisión quirúrgica informados en la literatura de los últimos cinco años.

El cuello de botella de la mejora de la precisión quirúrgica resultó de la dificultad de la fijación de la guía en pacientes edéntulos.

Surgery Guided Flapless

La precisión de la cirugía de implantes se puede lograr con una desviación de distancia < 2 mm (la mayoría < 1 mm) y una desviación angular < 8° (la mayoría < 5°).



Systematic Review

Guided Dental Implant Surgery: Systematic Review

Mario Dingwandl ^{1,*}, Francesca Spirito ², Cristiano Quarta ³, Diego Severino ⁴, Elisabetta Basile ¹, Andrea Iuliani ^{2,4}, Giorgia Apollonia ¹, G. Giuseppe Troiano ¹, Lorenzo La Muzio ¹ and Filiberto Mastrangelo ¹

¹ Department of Clinical and Experimental Medicine, University of Foggia, Via Rovelli 50, 71122 Foggia, Italy; ² Department of Precision Medicine, University of Campania "Luigi Vanvitelli", 80138 Naples, Italy; ³ Unità Operativa di Odontologia e Stomatologia, Ospedale Civile, ASL (Azienda Sanitaria Locale) Lecce, Via Giuseppe Verdi, 73030 Lecce, Italy; ⁴ Department of Health Sciences, University of Foggia, Via G. Cesare 111, 71122 Foggia, Italy

Abstract: Among the common procedures in clinical practice in the field of dentistry is prosthetic rehabilitation through the insertion of dental implants. In order to obtain the best aesthetic and functional results, the dental surgeon who deals with implantology must be able to position the dental implants correctly. A crucial role is therefore played by the diagnostic and treatment planning phases, where attention must be paid to anatomical constraints and prosthetic constraints in the alveolar bone site. The parameters, such as bone quality, bone volume, and anatomical restrictions, can be processed and simulated using implant planning software. The simulation of the virtual positioning of the implant can lead to the construction of a three-dimensional model of the implant positioning guide, which can be used during the implant surgery. The aim of this systematic review is to evaluate survival rates, early and late failure rates, post-implant bone remodeling, and possible implant-prosthetic complications related to implants placed using digitally designed surgical guides. This systematic review was written following the indications of PRISMA and evaluated the use of 3 databases: Scopus, PubMed, and Cochrane Library. Results: Only 9 of the 2001 records were included, including 2 retrospective studies and 7 prospective studies. Conclusions: On the basis of the studies selected in this review, it can be seen that the implant survival obtained with the use of guided implant surgery shows high percentages. Many recorded failures occurred early, due to a lack of concentration, and the variables that come into play in the survival of the implants are many.

Keywords: computer-assisted; survival; implant; PRISMA; dental implantology

La supervivencia de los implantes obtenida con el uso de la cirugía guiada de implantes muestra porcentajes altos.

Además, muchos de los fallos registrados se produjeron de forma precoz, debido a una falta de osteointegración, y las variables que entran en juego en la supervivencia de los implantes son muchas

Accuracy of dynamic navigation compared to static surgical guide for dental implant placement

Dongyue Lin, Zhaohui Wang, Bao Zeng, Yanguan Lin, Jia Chen, Xiaohua Huang and Yonghui Chen

Abstract: Objective: To compare the accuracy of dynamic navigation (DN) with a static surgical guide (SSG) for dental implant placement and the influence factors such as the experience of the surgeon and the implant site. Methods and materials: A total of 38 implants, which underwent the dynamic navigation, and 57 implants which underwent a static surgical guide were enrolled. The accuracy of dynamic navigation and static surgical guide was compared between the two groups. Results: There were no significant differences in the accuracy of dynamic navigation and static surgical guide between the two groups. Conclusions: Dynamic navigation can achieve accurate implant placement as well as the static surgical guide. Additionally, the experience level of the surgeon and implant site do not influence the accuracy of dynamic navigation, while the accuracy of DN seems higher than the SSG in molar.

Keywords: Dynamic navigation; Static surgical guide; Accuracy; Dental implants; Surgeon experience; Implant site

Introduction: As a method of replacing missing teeth, dental implants have been widely used in clinic. However, with the development of implant technology, there are also various post-operative complications, such as damage to the adjacent structure, aesthetic problems, post-implant inflammation, and even implant failure [1]. Research has shown that many complications were associated with inaccurate design of implant placement [2], while correct implant positioning has obvious advantages, such as good aesthetic results. Computer-aided implant surgery (CAIS), based on image data navigation, was introduced into the field of dental surgery to improve the accuracy of implant placement and avoid potential complications in order to meet the criteria of clinical needs [3]. CAIS contains a static surgical guide template and dynamic navigation. Static surgical guide template refers to the location of a virtual implant designed according to the CT data, so as to accurately guide the preparation and placement of the implant under the guidance of a surgical guide template, but the template is not allowed to modify the

long-term health of soft and hard tissue, and it can cause optimal occlusion and implant loading [4–6]. In addition, fixed implant location optimizes the design of the final restorations and enables the design and manufacture of a precise restoration, which can avoid the restoration of the adjacent organs [6]. Computer-aided implant surgery (CAIS), based on image data navigation, was introduced into the field of dental surgery to improve the accuracy of implant placement and avoid potential complications in order to meet the criteria of clinical needs [3]. CAIS contains a static surgical guide template and dynamic navigation. Static surgical guide template refers to the location of a virtual implant designed according to the CT data, so as to accurately guide the preparation and placement of the implant under the guidance of a surgical guide template, but the template is not allowed to modify the

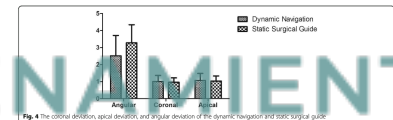


Fig. 4 The coronal deviation, apical deviation, and angular deviation of the dynamic navigation and static surgical guide

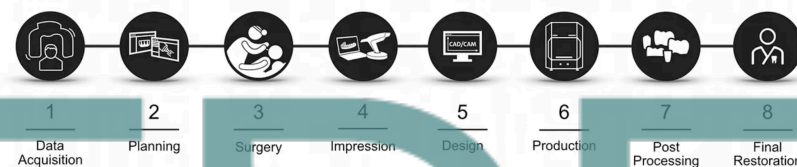


La navegación dinámica puede lograr una colocación precisa del implante, al igual que la guía quirúrgica estática. Además, el nivel de experiencia del cirujano y el lugar del implante no influyen en la precisión de la navegación dinámica, mientras que la precisión de la DN parece ser mayor que la de la SSG en molares.



Work Flow

Implantología Digital



1
Data Acquisition

Dentado Parcial



Desdentado



Selección del paciente

La base principal del tratamiento es la prótesis provisional fija inmediata, por tanto, nuestro **objetivo quirúrgico** será poder realizar esta **prótesis provisional fija inmediata**, que nos dará toda la información **estética y funcional**. En muchos casos será necesario realizar varias prótesis provisionales fijas, después del primer mes posoperatorio hasta llegar a la prótesis provisional maqueta definitiva que vamos a copiar en la prótesis final.

También en aquellos casos en los que no sea posible realizar la carga inmediata, conservaremos toda la información del proceso diagnóstico digital y, una vez osteointegrados los implantes, realizaremos la prótesis provisional fija y seguiremos el mismo flujo de trabajo con diferentes provisionales, si son necesarios.



El primer contacto...

- Debemos comprender perfectamente las necesidades que nos expone el paciente
- Motivo de su consulta
- Antecedentes personales
- Tratamientos previos y la evolución que han sufrido los mismos.

Fundamental buscar en esos primeros minutos un análisis de la personalidad del paciente para hacernos una idea de sus expectativas y de su grado de colaboración.

El primer contacto...



Anamnesis de su estado médico general

Entregamos siempre al o la paciente una hoja de autodespistaje de enfermedades y hábitos que nos orienten en esta primera anamnesis.

El primer contacto...

Hay que resaltar que el tratamiento inmediato presenta indudables ventajas, por ejemplo realizando cirugías **minimamente invasivas** o al proporcionarnos un **protocolo digital** disminuyendo el número de procedimientos y logrando que estos sean más llevaderos por el paciente.

Las contraindicaciones más claras son:

- Ausencia de calidad y cantidad ósea insuficiente
- Quimioterapia, radioterapia de cabeza y cuello, bifosfonatos, neoplasias malignas, inmunosupresión, adicción a drogas o alcohol.

¿Carga Inmediata?

Examen intraoral. Escaneado intraoral modelo de estudio

- Grado de atrofia ósea en las zonas edéntulas.
- Evaluación de la encía, presencia de encía queratinizada.
- Forma del reborde alveolar remanente.
- Presencia de prótesis removibles, completas o parciales y su estado.
- Valoración estética del paciente con y sin las prótesis
- Evaluación de la pérdida tisular tridimensional que normalmente obligará a utilizar prótesis híbridas dentogingivales.

Extraoral

Es importante considerar también el espacio y relación entre ambos arcos dentales. Forma y asimetría del arco.

Evaluación de la longitud del labio superior desde subnasal hasta el filtrum, siempre en reposo. Esta determina la visibilidad del borde incisal de los incisivos centrales superiores.

Es importante, una vez determinada, evaluar la movilidad labial en sonrisa y máxima sonrisa para identificar asimetrías



Conclusión general

Todo ello nos lleva a una primera conclusión general del posible tratamiento implantológico y protético que debemos confirmar con el resto de las exploraciones.

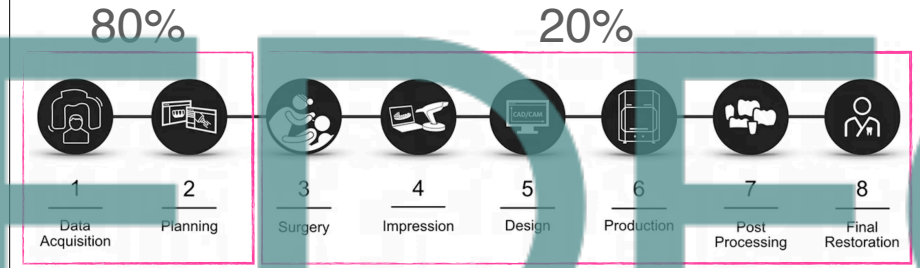
Igualmente, cabe recordar que nuestro protocolo es totalmente digital, por lo que mostraré los pasos del mismo. No obstante, en algunas situaciones se debe aplicar una mezcla de planificación convencional y digital.



¿Que modelos
digitales
necesitamos para un
arco completo?

Work Flow

Digital Implantology



Paciente
con prótesis



Paciente
sin prótesis



Paciente sin prótesis

Digital

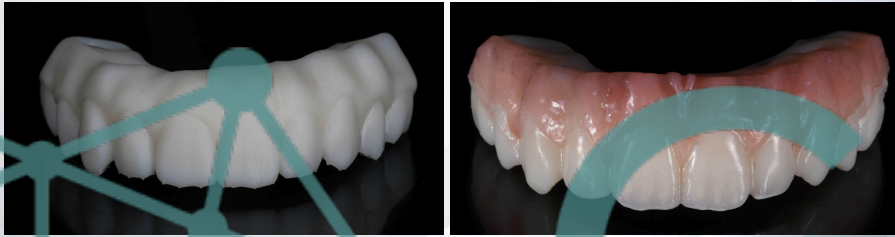


Convencional



Paciente sin prótesis

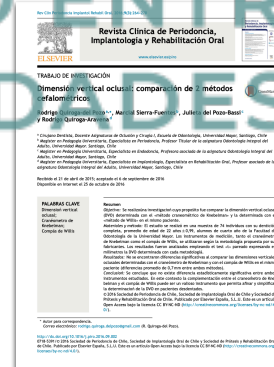
Digital



¿Como lo hacemos?

Dimensión Vertical Oclusal (DVO)

Dimensión Vertical Oclusal (DVO)



Dimensión Vertical Oclusal (DVO)



Willis: Compas de willis

- Canto externo de ojo hasta la comisura labial
- Base de la nariz hasta el punto más anterior e inferior del mentón siguiendo la línea media de la cara

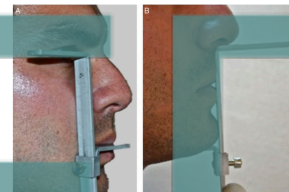
Knebelman: Craneómetro de Knebelman

- Pared anterior del canal auditivo externo hasta el ángulo lateral de la órbita
- Mentón (superficie inferior y más anterior de la mandíbula) y la espina nasal anterior.

Dimensión Vertical Oclusal (DVO)

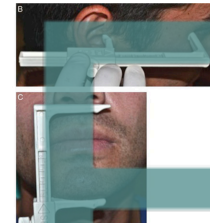
Willis: Compas de willis

- Canto externo de ojo hasta la comisura labial
- Base de la nariz hasta el punto más anterior e inferior del mentón siguiendo la línea media de la cara

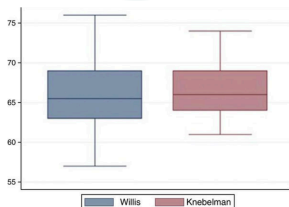


Knebelman: Craneómetro de Knebelman

- Pared anterior del canal auditivo externo hasta el ángulo lateral de la órbita
- Mentón (superficie inferior y más anterior de la mandíbula) y la espina nasal anterior.



Dimensión Vertical Oclusal (DVO)



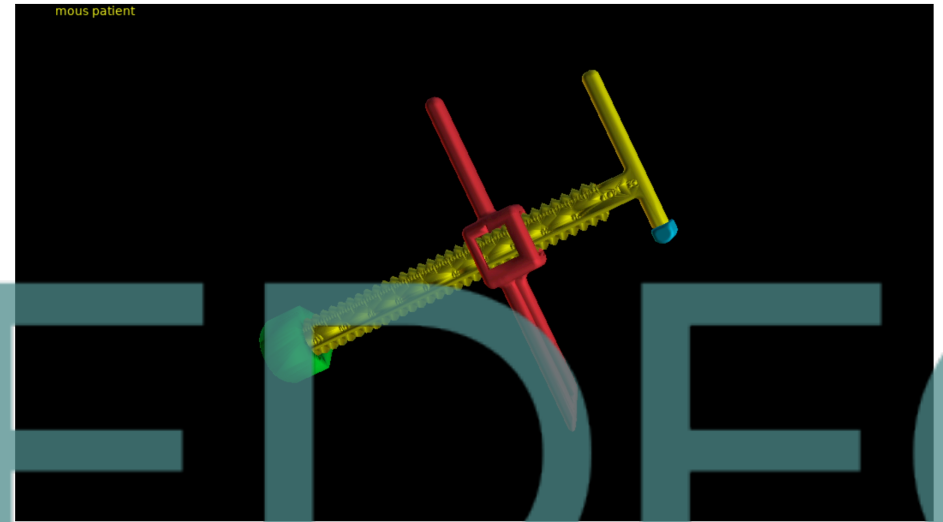
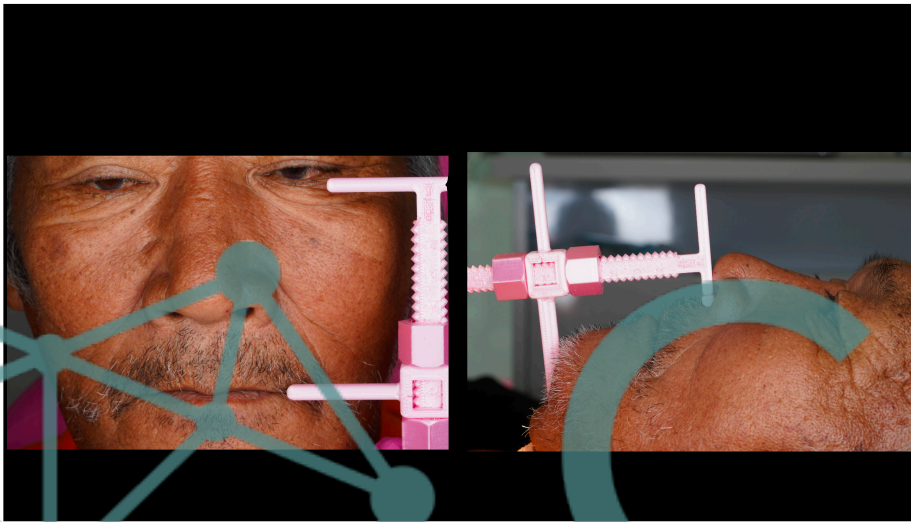
Se concluye que no existe diferencia estadísticamente significativa entre ambos instrumentos estudiados. En este contexto la complementación entre el craneómetro de Knebelman y el compás de Willis puede ser un valioso instrumento que permita afinar y simplificar la determinación de la DVO en pacientes desdentados.

Dimensión Vertical Oclusal (DVO)



La magnitud de la DVO determinada mediante métodos convencionales mayoritariamente es superior a la sugerida por el método Craneómetro de Knebelman para los mismo pacientes. No existe variación en la magnitud de la DVO observada cuando en su determinación se emplean uno o más métodos de referencia. Si bien, las diferencias de magnitud entre ambos métodos de registro son estadísticamente significativas, no representan significancia clínica.

Sugerencia: El Craneómetro de Knebelman podría constituir un valioso instrumento que permitiría establecer una DVO inicial o de base, a partir de la cuál se podría establecer la DVO definitiva, complementándolo con los procedimientos convencionales de registro



- 1.- Encuentre la nueva dimensión vertical con el medidor MOD VDO o sistema que usted elija
2. Escanee las arcadas desdentadas utilizando un escáner intraoral de su elección.

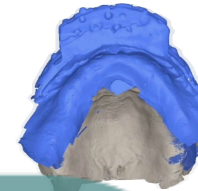
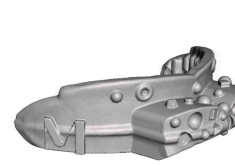


Asegúrese de escanear los bordes y la anatomía crítica, como la muesca hamular y las almohadillas retromolares.

¿cómo registramos nuestra dimensión vertical de forma digital?



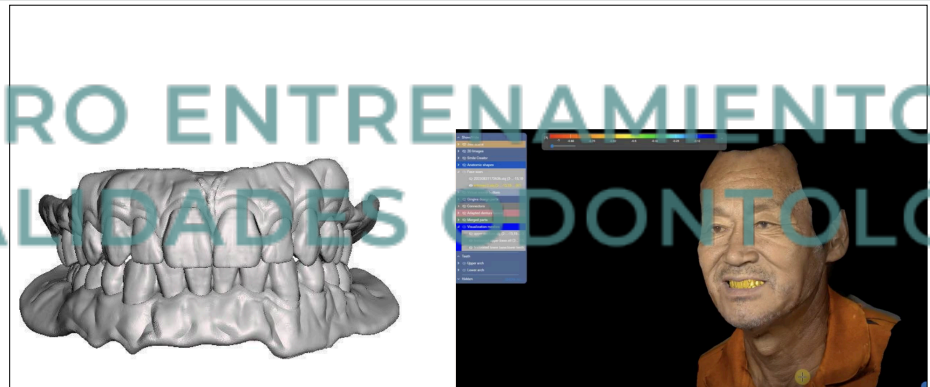
Necesita una forma de capturar la mordida y fusionar las impresiones digitales en esta nueva DVO en Relación céntrica

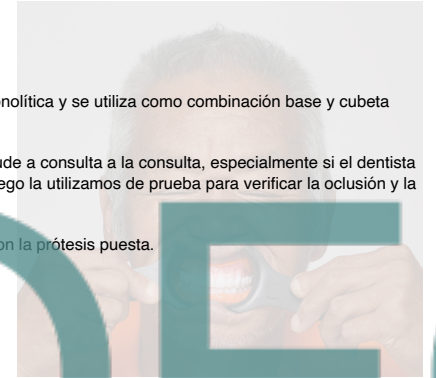


Esto tradicionalmente ha sido difícil en flujos de trabajo digitales. La bandeja "Centric" está diseñada para usarse como soporte con masilla. La masilla se coloca en la bandeja y se le pide al paciente que muerda. Todo este sistema de bandejas y masilla se escanea con un IOS y se utiliza para fijar los arcos maxilar y mandibular a la mordida céntrica en bandeja. Algunos programas de IOS harán esto automáticamente, pero, si no, el software de laboratorio lo hará



El escaneo facial 3D también se puede fijar a la bandeja central, lo que brinda al equipo de diseño la capacidad de ver los arcos de la cara para el diseño de la sonrisa. si el escaneo facial en 3D no se puede obtener, las fotos en 2D también pueden funcionar.

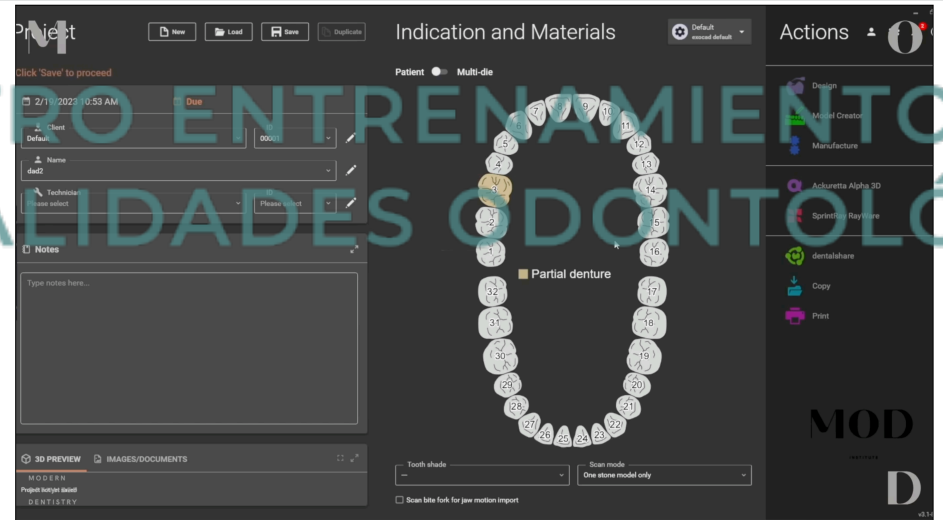
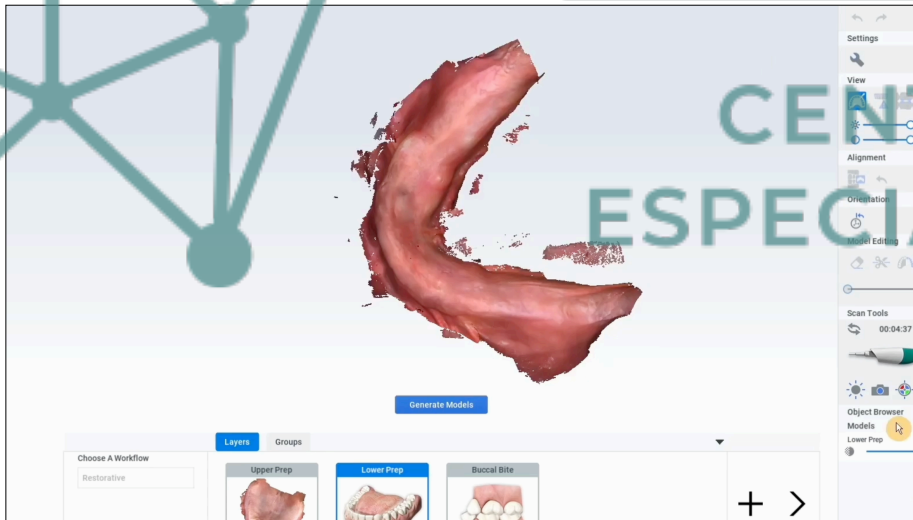




Normalmente, una prótesis de prueba se imprime monolítica y se utiliza como combinación base y cubeta funcional.

A menudo se hacen el mismo día que el paciente acude a consulta a la consulta, especialmente si el dentista tiene laboratorio interno con un equipo de diseño. Luego la utilizamos de prueba para verificar la oclusión y la estética.

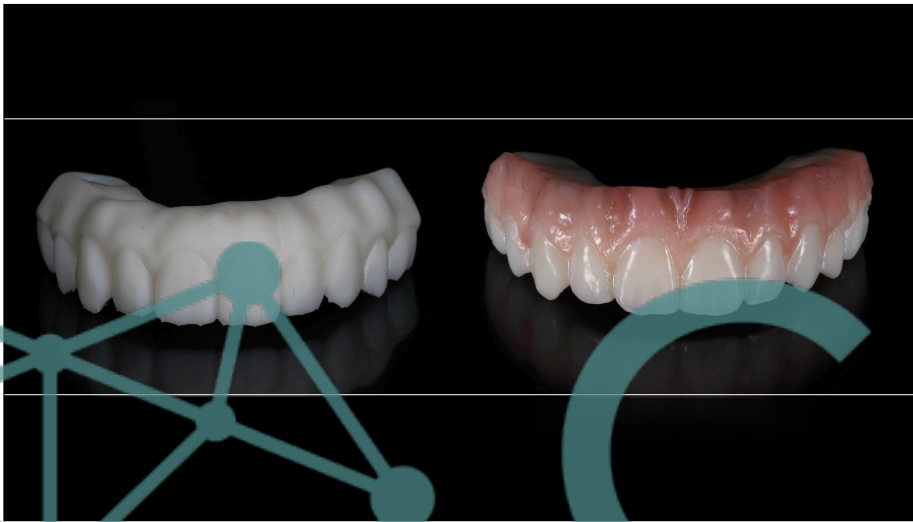
Se realizan nuevas fotografías y escaneos faciales con la prótesis puesta.





CEDC

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



CEDEO

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



Paciente
con prótesis



Paciente
sin prótesis



Paciente
con prótesis

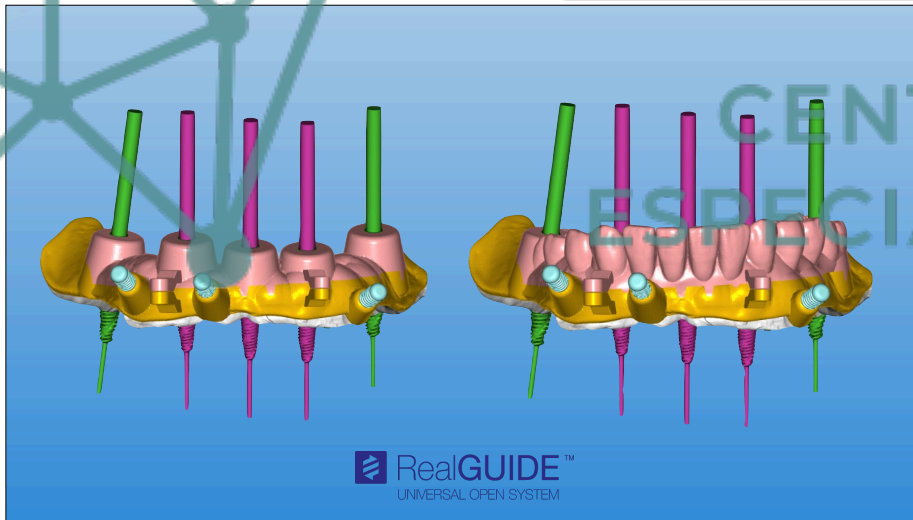
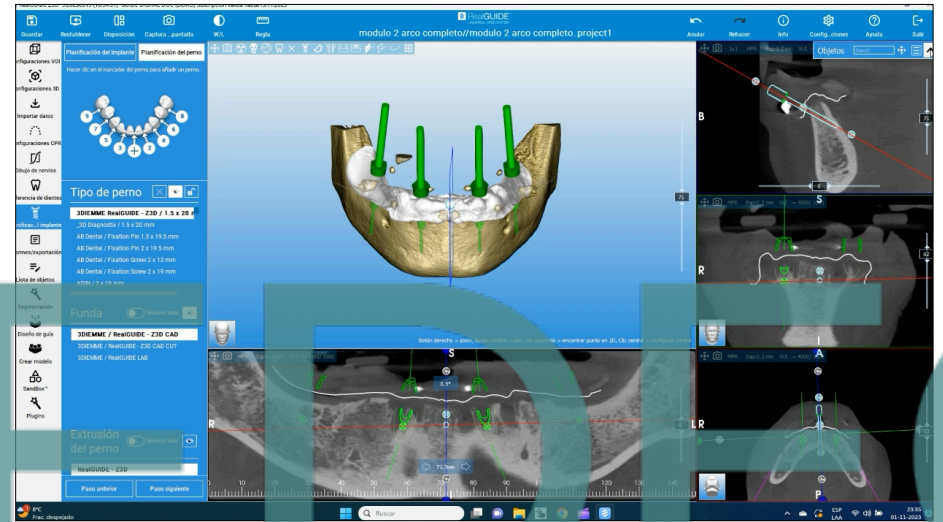


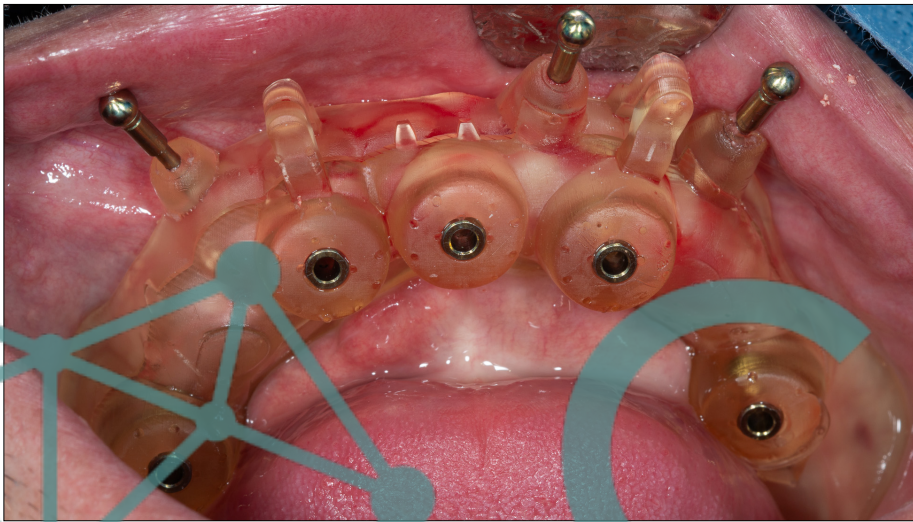
Desdentado





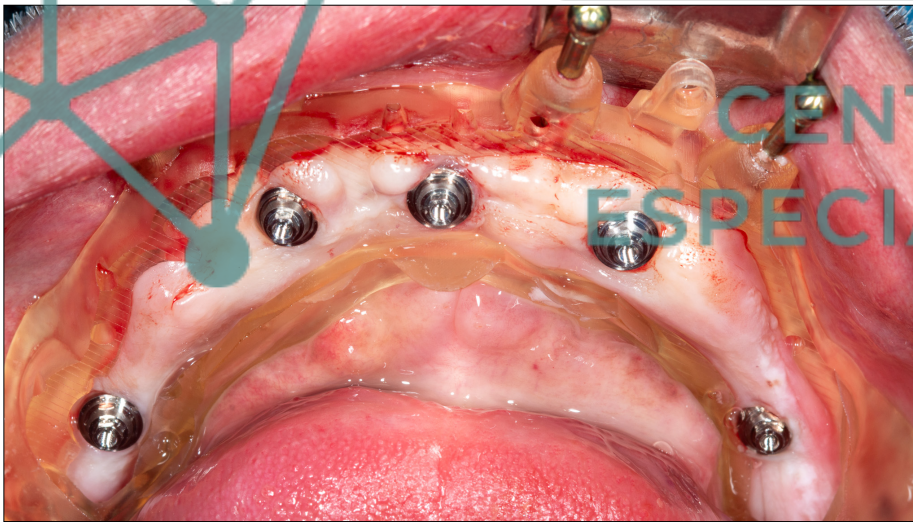
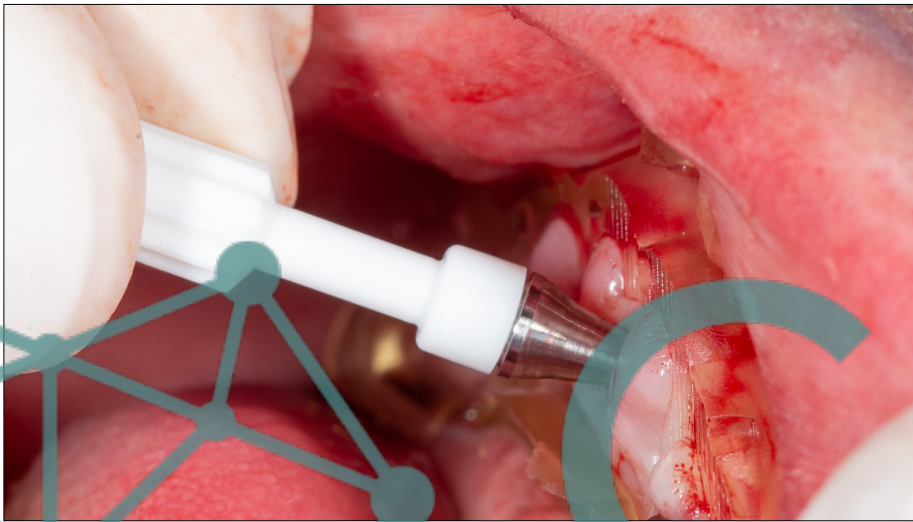
ENCERADO DIGITAL Y DISEÑO DE PROTESIS PROVISORIA





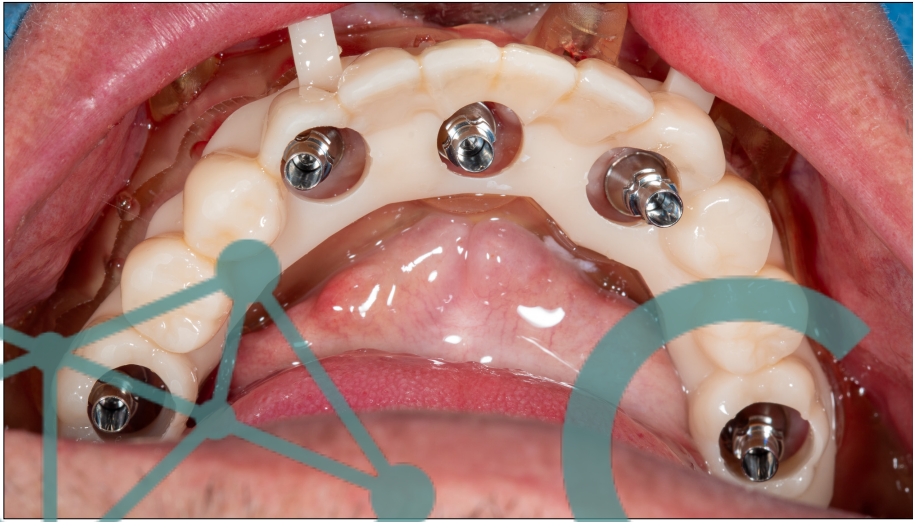
CEDDEC

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



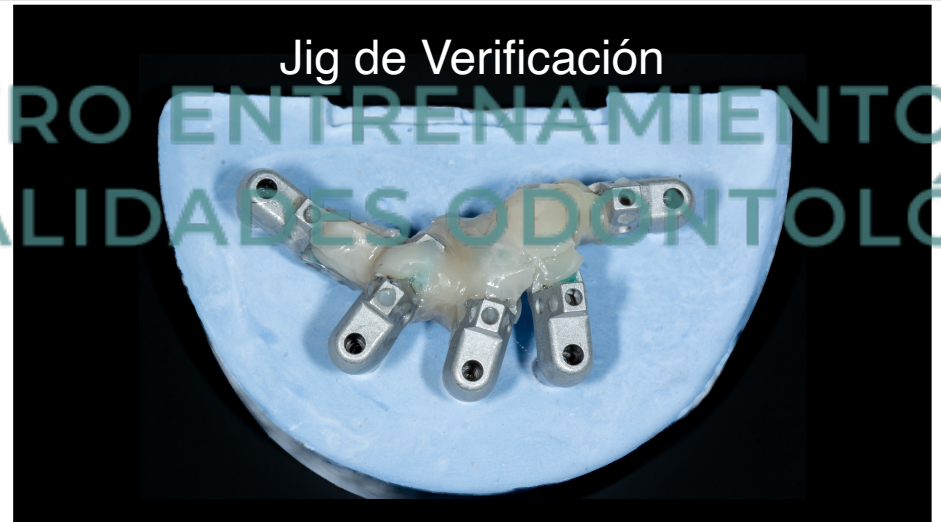
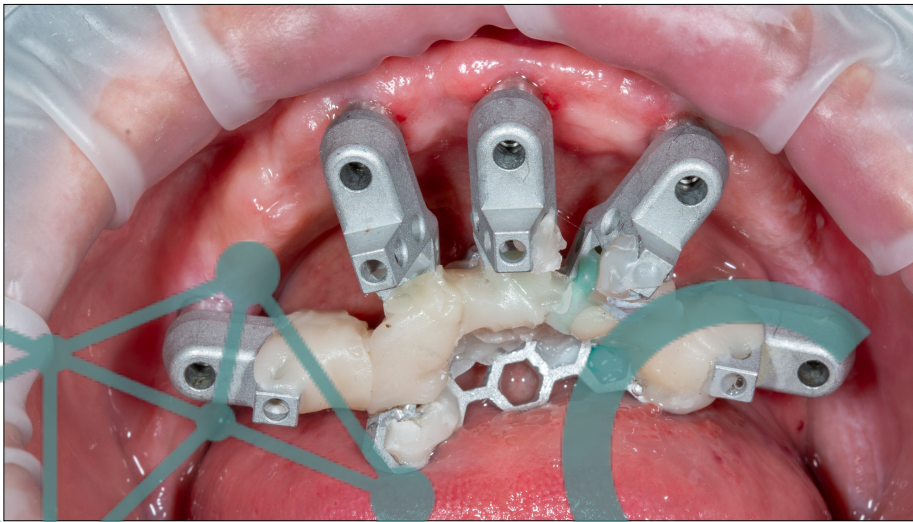
C E D E C

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



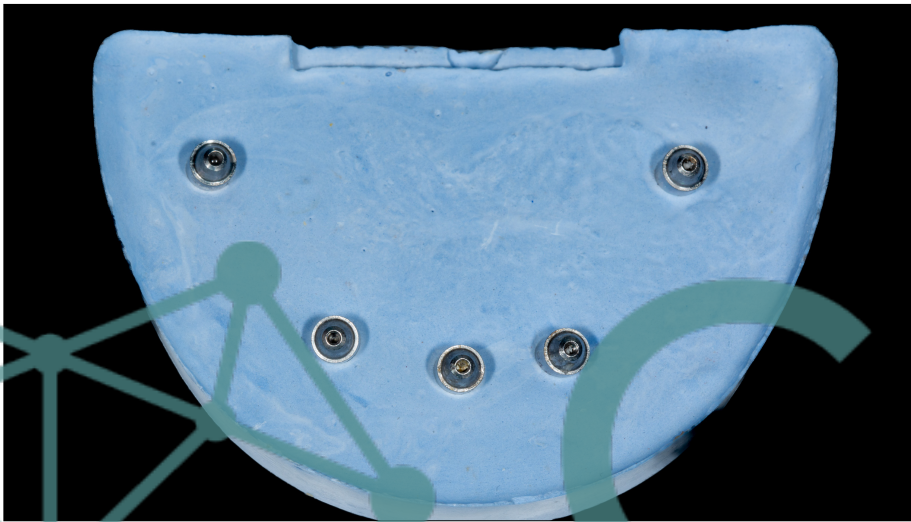
CEDDEO

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



Jig de Verificación

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



Work Flow

Digital Implantology

80%

20%



1
Data Acquisition



2
Planning



3
Surgery



4
Impression



5
Design



6
Production

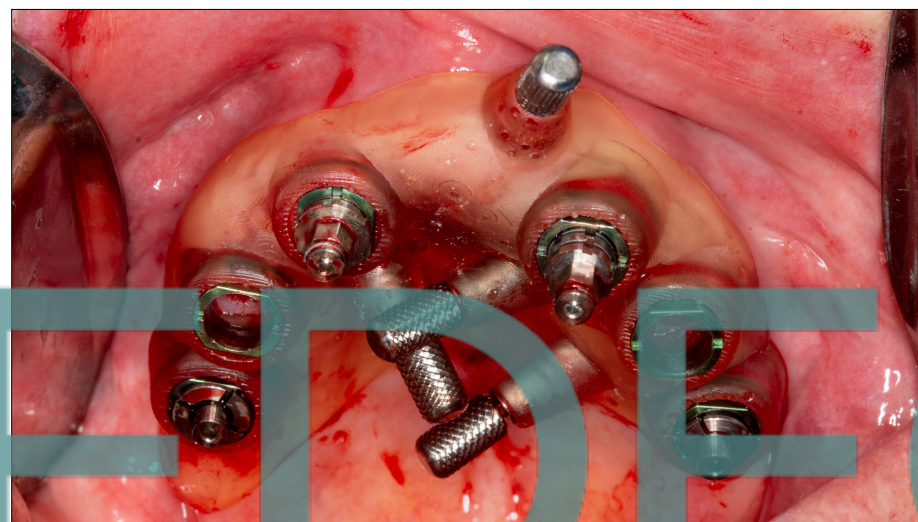
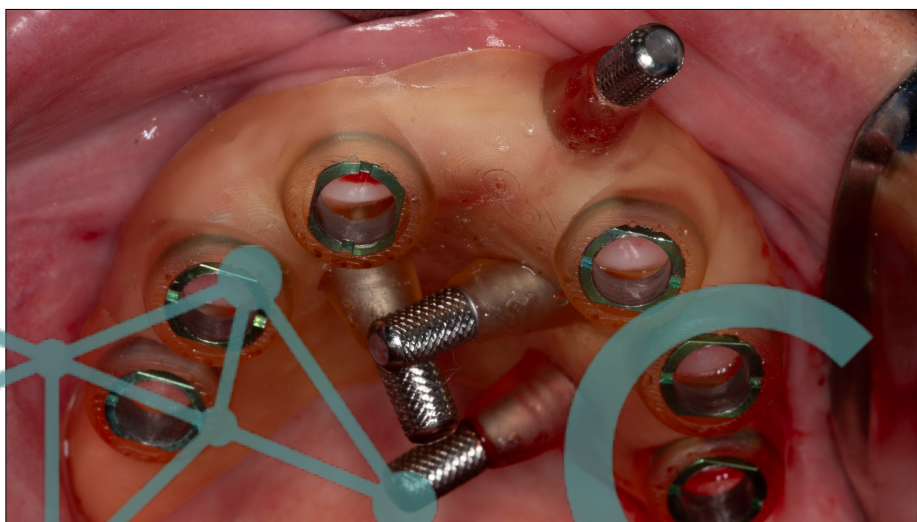


7
Post Processing



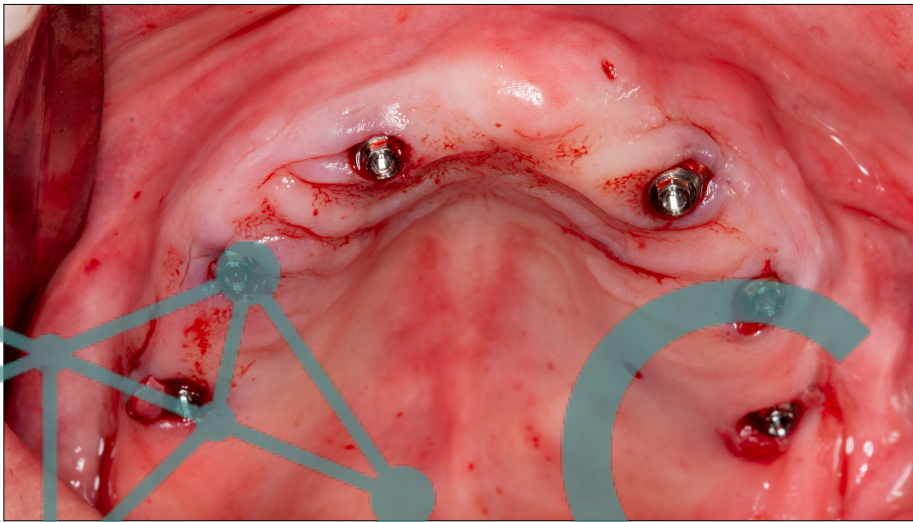
8
Final Restoration





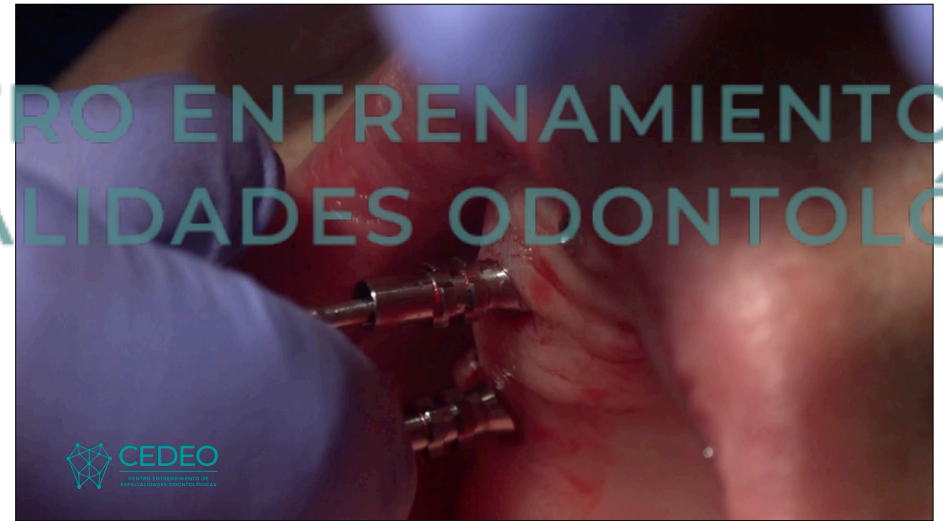
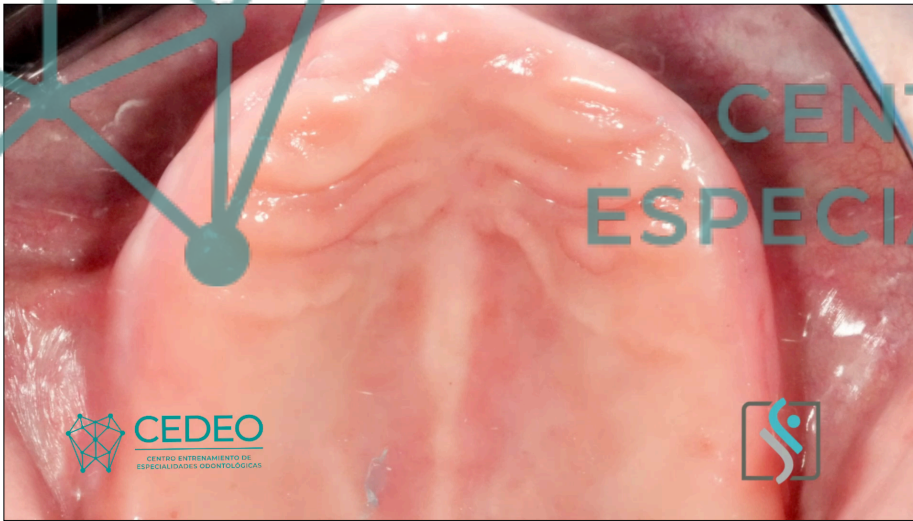
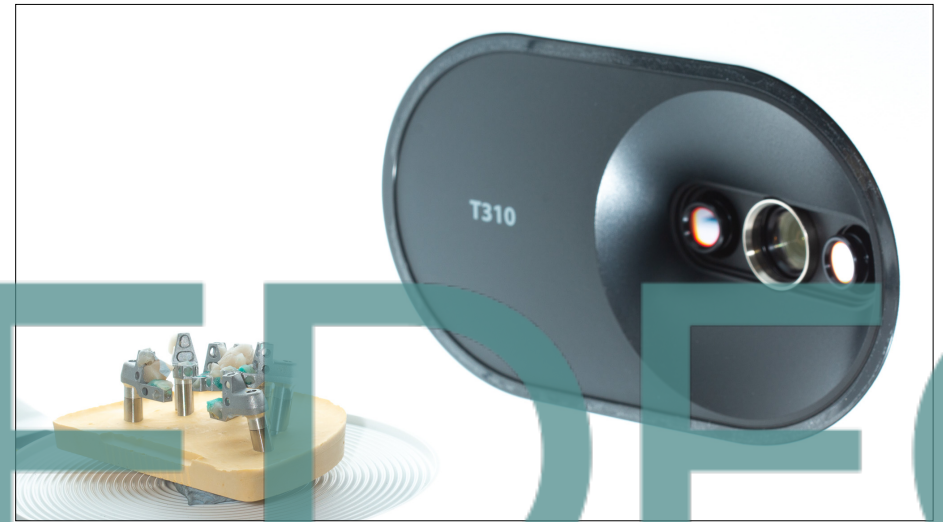
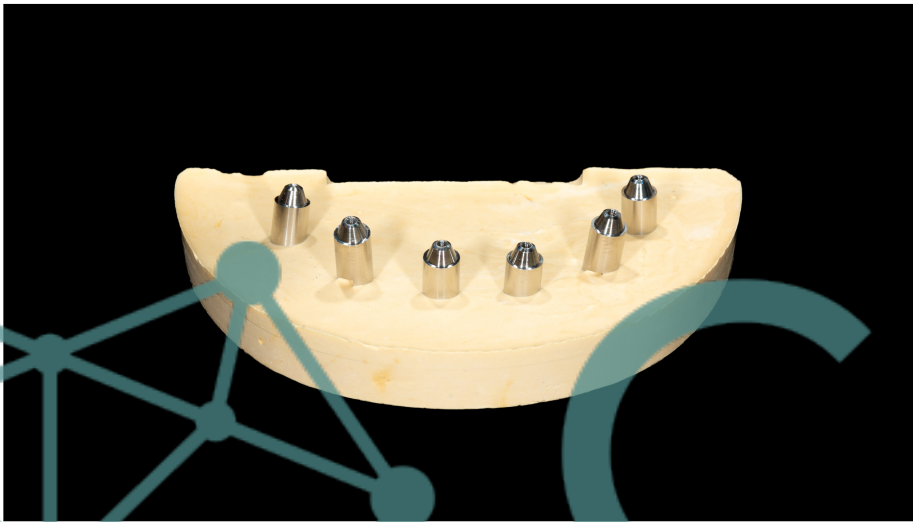
CEDC

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



CEDDEC

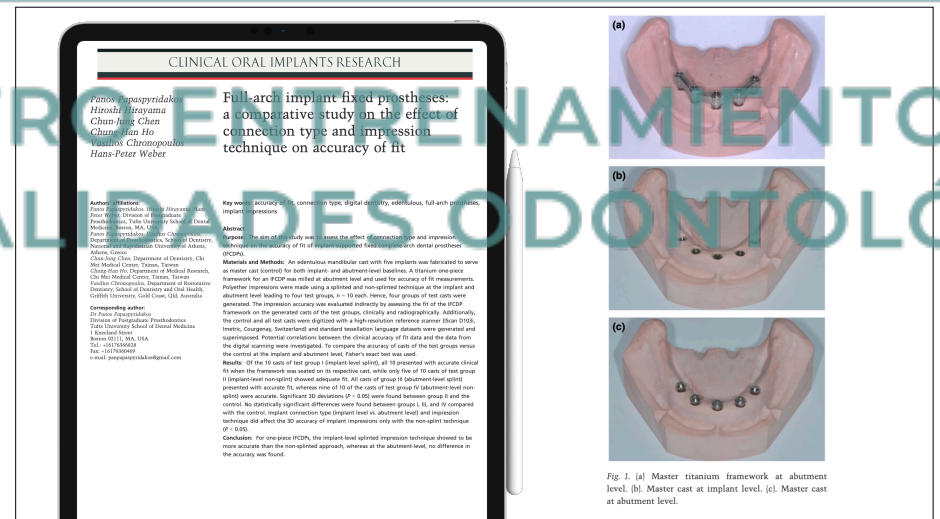
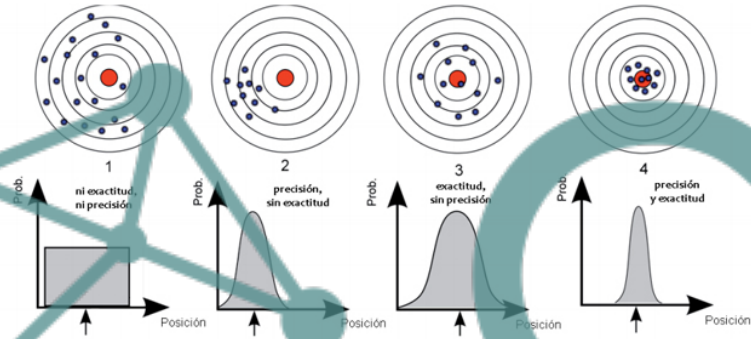
CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG

Veracidad: está determinada por la veracidad con la que el modelo digital se corresponde con el objeto escaneado ("trueness")

Precisión: capacidad de reproducir fielmente el objeto con la misma veracidad cada vez que se escanea



- Entre los escáneres probados, Medit T710 y 3Shape E4 mostraron la mayor veracidad.
- Entre los escáneres probados, el brillante 3D autoscan ds-mix mostró la menor precisión.
- Todos los escáneres probados mostraron valores de veracidad y precisión inferiores a 150 µm.
- El aumento de la angulación distal del implante afectó negativamente la precisión del escaneo

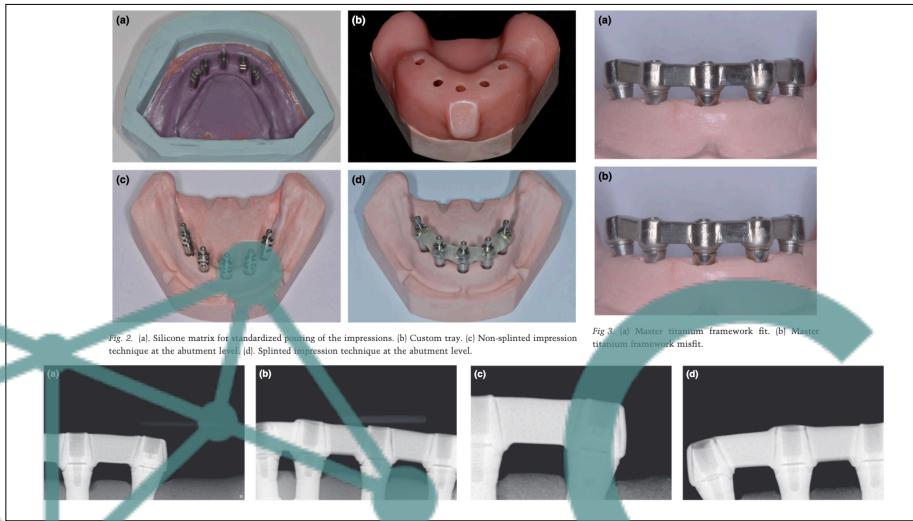
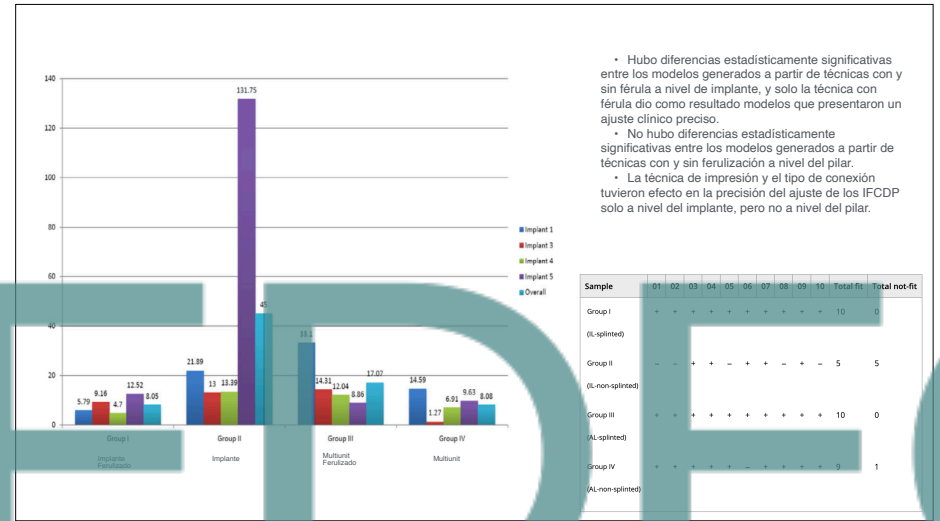


Fig 2. (a) Silicone matrix for standardized printing of the impressions. (b) Custom tray. (c) Non-splinted impression technique at the abutment level. (d) Splinted impression technique at the abutment level.

Fig 3. (a) Master titanium framework fit. (b) Master titanium framework misfit.



- Hubo diferencias estadísticamente significativas entre los modelos generados a partir de técnicas con y sin férula a nivel de implante, y solo la técnica con férula dio como resultado modelos que presentaron un ajuste clínico preciso.
- No hubo diferencias estadísticamente significativas entre los modelos generados a partir de técnicas con y sin férulización a nivel del pilar.
- La técnica de impresión y el tipo de conexión tuvieron efecto en la precisión del ajuste de los IFCDP solo a nivel del implante, pero no a nivel del pilar.

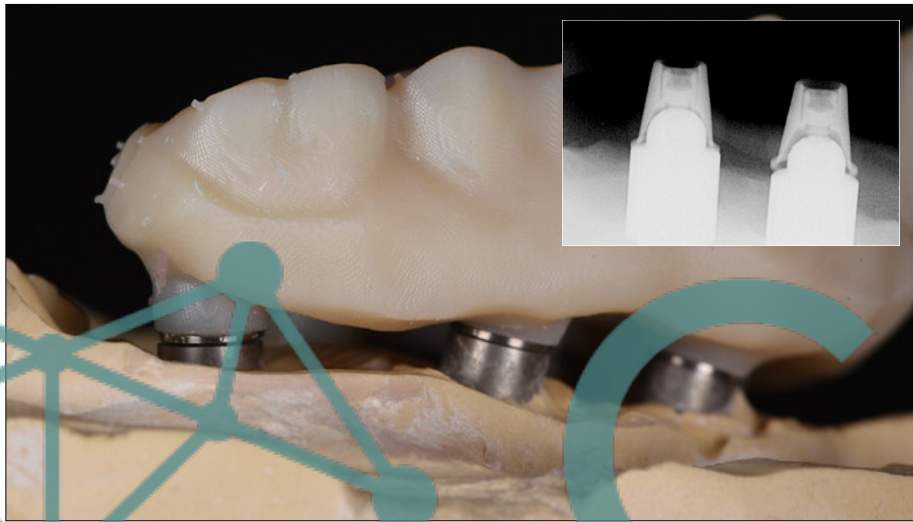
Complete digital workflow for prosthesis prototype fabrication with double digital scanning: A retrospective study with 45 edentulous jaws

Panos Papagrigoriadis DDS, MS, PhD^{1,2} | Konstantinos Vamvakos DDS, MS, MPA, FACP³ | Sotirios Gotsis DDS⁴ | Alkhatib Alkhatib DDS, MSc⁵ | Elana Sicilia DDS, MS⁶ | Yukio Kodaira CDT, MDT⁷ | Armand Bellasian DDS, MSD, FACP⁸ | Konstantinos Chochlidakis DDS, MS, FACP⁹

Abstract
Purpose: To assess the accuracy of fit of complete arch printed prosthesis prototypes generated with a digital workflow for complete arch edentulous jaws.
Materials and methods: Forty-five edentulous jaws (15 patients) underwent intraoral complete arch digital scans with the double digital scanning (DDS) technique and the generated scanning resolution images (STL) files were superimposed and imported into complete arch design software. After STL merging, each master STL file was used for printing a prosthesis prototype. The primary outcome was the accuracy of fit measurement of the printed prototypes on verified master stone casts. Two experienced clinicians tested the accuracy of fit with radiographic and screw-resistance tests. Secondary outcomes were the effect of the scan body shape and implant number on the accuracy of fit.
Results: Out of the 45 DDS-generated prosthesis prototypes, 39 presented with accuracy fit on verified master stone casts, yielding an 86.70% accuracy of fit. Cylindrical scan bodies led to 100% accuracy of fit (2/2), whereas polygonal scan bodies presented with 70% accuracy of fit (14/20). Four implant-supported prostheses yielded 100% accuracy of fit (12/12), compared with 25/29 (86.20%) accuracy of fit for the six implant-supported ones. Fisher's exact test was used to assess the effect of different scan body shapes ($p < 0.001$) and implant number on accuracy of fit. Chi-square test was used to assess the association between the number of implants per arch and the accuracy of fit ($p = 0.039$).
Conclusions: Thirty-nine out of 45 complete arch prosthesis prototypes generated with a complete digital workflow presented with clinically acceptable fit. The effect of the scan body design and implant number was statistically significant, favoring cylindrical scan bodies and four implant-supported prostheses.

KEYWORDS
 3D printing, complete digital workflow, complete arch digital scan, complete arch implant rehabilitation, printed implants, digital implant impressions, digital implant scan, digital workflow, full-arch digital scan, full-arch prosthesis, full-arch scans, complete arch

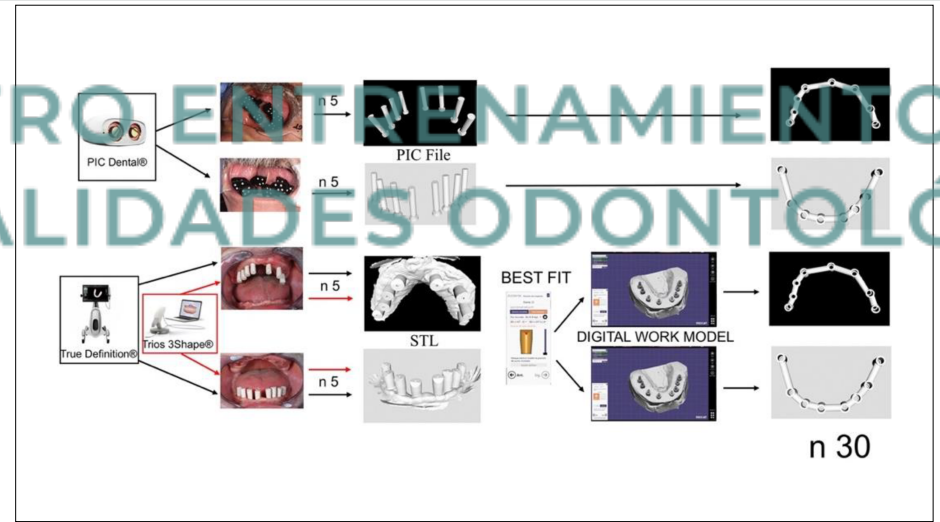
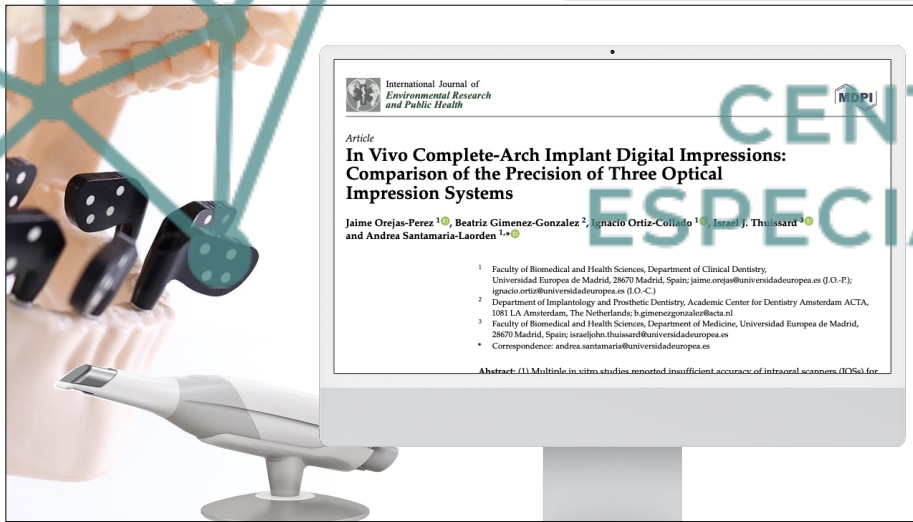


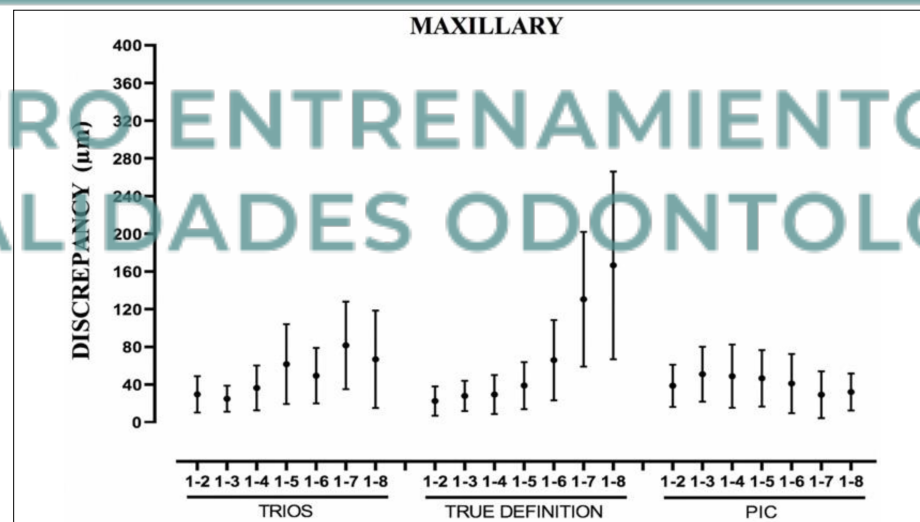
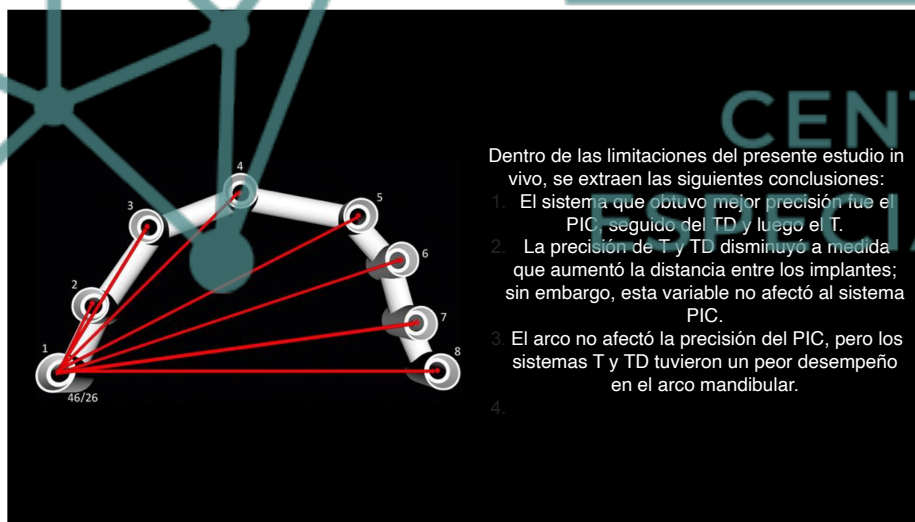
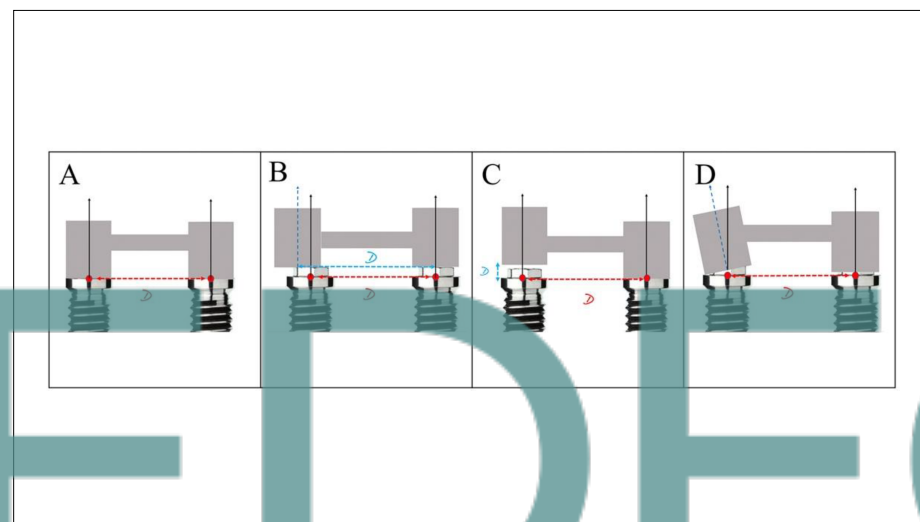
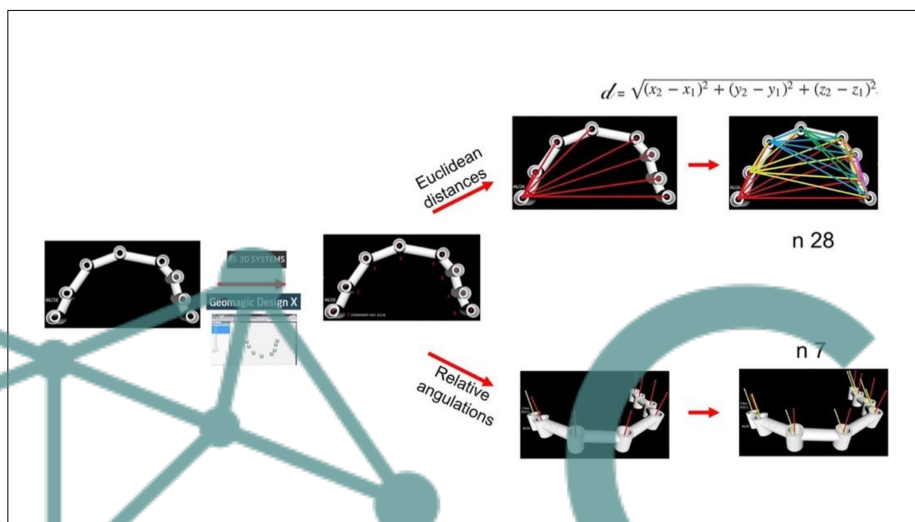


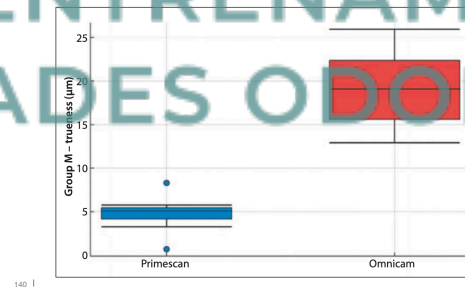
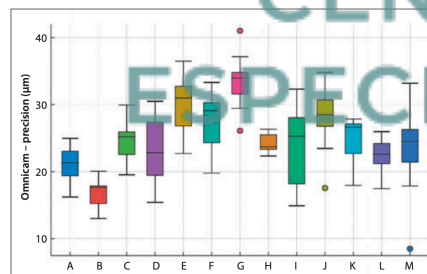
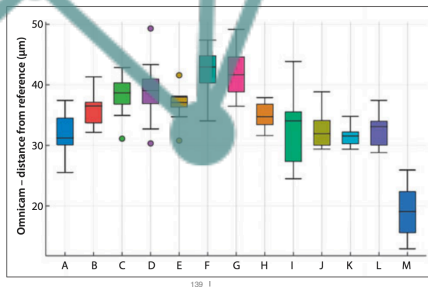
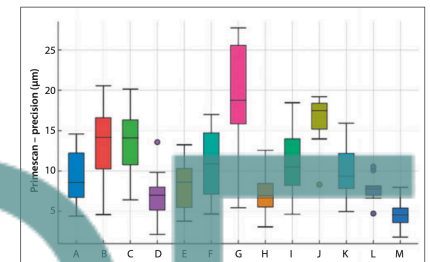
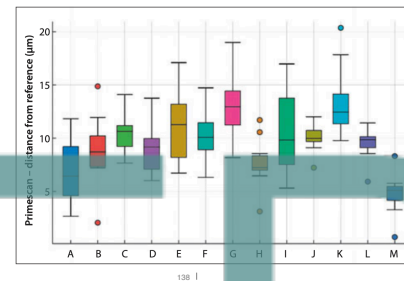
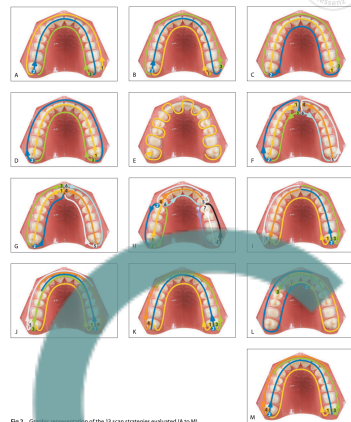
	Fit		Misfit		p-Value
	Frequencies	%	Frequencies	%	
Scan body shape					
Cylindrical (n = 25 jaws)	25	100.00	0	0.00	0.005 *
Polygonal (n = 20 jaws)	14	70.00	6	30.00	
Arch					
Maxilla (n = 26)	20	76.92	6	23.08	0.028 *
Mandible (n = 19)	19	100.00	0	0.00	
Number of implants per IFCDP					0.039 *
Four Implants (n = 12)	12	100.00	0	0.00	
Five implants (n = 4)	2	50.00	2	50.00	
Six implants (n = 29)	25	86.20	4	13.80	

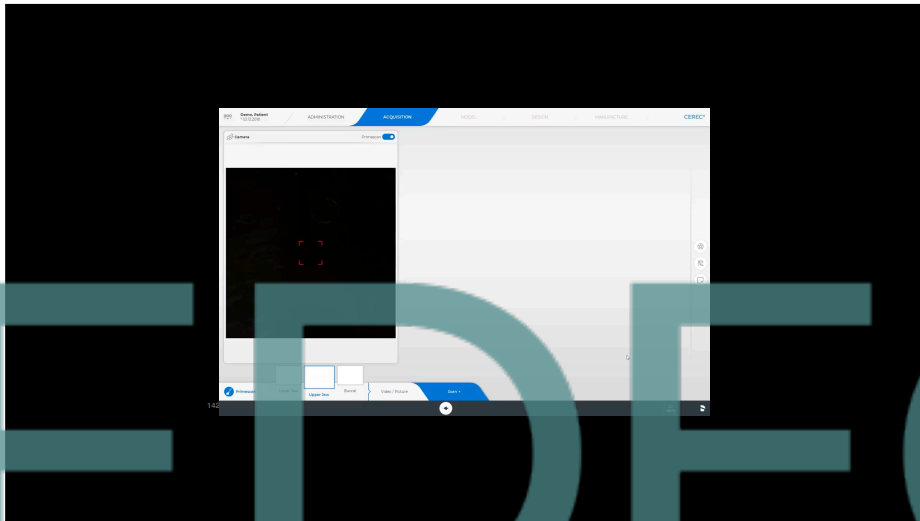
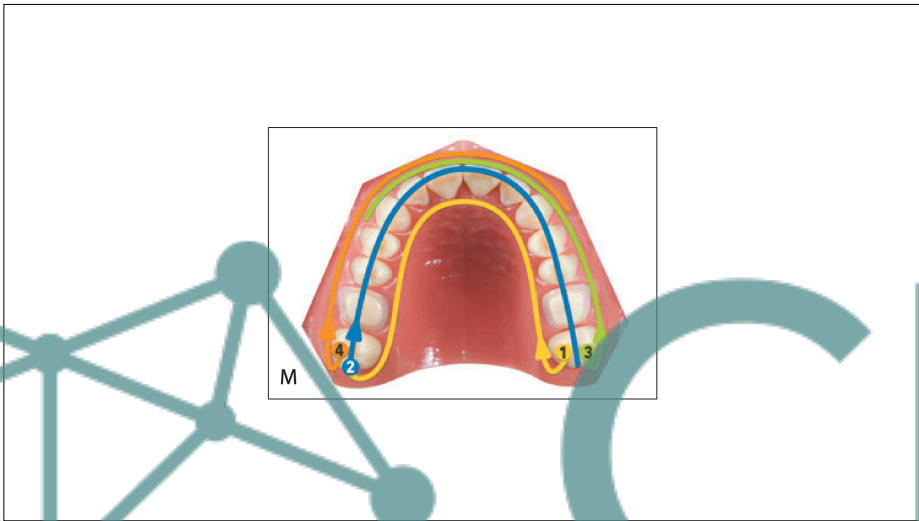
Abbreviation: IFCDP, implant-supported fixed complete dental prosthesis.

* statistical significance.









Received 21 January 2023 | Revised 20 May 2023 | Accepted 21 May 2023
DOI: 10.1111/jcoo.12670

RESEARCH ARTICLE

Effect of different intraoral scanners and scanbody splinting on accuracy of scanning implant-supported full arch fixed prosthesis

Yasmine Ashraf BDS, MSc | Ahmad Abo El Fall BDS, MSc, PhD |
Amina Elmagdy BDS, MSc, PhD | Kamal Elmagdy BDS, MSc, PhD

Department of Fixed Prosthodontics,
Faculty of Dentistry, Ain Shams University,
Cairo, Egypt

Correspondence:
Ahmad Abo El Fall, Faculty of Dentistry, Ain Shams
University, Department of Fixed Prosthodontics,
Shoubra El-Khayma, Cairo, Egypt.
Email: aabofall@dent.assu.edu.eg

Abstract
Objective: This study evaluated the accuracy of different intraoral scanners (IOS) for working on implant-supported full arch fixed prosthesis with different implant angulations using scanbody splinted techniques.

Materials and Methods: Two maxillary models were designed and fabricated to receive 6 and 4 full arch implants (standard). The models were divided into two groups according to the angulation of the posterior implant (Group 1: 30° and Group 2: 45°). Each group was then divided into three subgroups according to the type of IOS used: Subgroup A: Trioscan; Subgroup B: Trioscan; and Subgroup C: Model 1000. Then each subgroup was divided into two divisions according to scanning technique: division S: splinted and division N: nonsplinted. Ten scans were made by each scanner for every division. Trueness and precision were analyzed using Geomagic control analytics software.

Results: Acquisition had no significant effect on both the trueness ($p = 0.854$) and precision ($p = 0.347$). Splinting had a significant effect on trueness and precision ($p < 0.001$). Scanner type had a significant effect on trueness ($p < 0.001$) and precision ($p < 0.001$). There was no significant difference between trueness of Trios 4 (112.15 ± 12.83) and Trioscan (106.75 ± 22.38). However, there was a significant difference when compared to trueness of Model 1000 (108.50 ± 27.45). For the precision results, Core Precision showed the highest precision (95.45 ± 32.21). There was a significant difference between the three scanners, precision of Trios 4 (107.72 ± 12.34) and Model 1000 (121.21 ± 17.38). Conclusion: Core Precision has higher trueness and precision than Trios 4 and Model 1000 in full arch implants scanning. Splinting the scanbodies improve the accuracy of full arch implants scanning.

Clinical Significance: Core Precision and 3Shape Trios 4 can be used for scanning of full arch implant supported prosthesis when scanbodies are splinted using a modular chain device.

KEYWORDS
intra-oral dental implants, digital dentistry, fixed prosthodontics, implant, scanbody

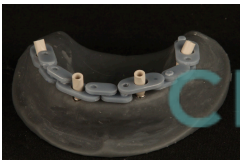


TABLE 1 Effect of angulation trueness and precision

Measurement	Angle	Mean ± SD [μm]	95% CI		p Value
			Lower	Upper	
Trueness	30°	121.57 ± 10.72	-11	18.11	0.004
	45°	122.62 ± 20.35	-4.1	18.18	0.004
Precision	30°	119.92 ± 21.79	-4.1	18.18	0.004
	45°	115.54 ± 12.85	-4.1	18.18	0.004

Abbreviations: 95% CI, 95% confidence interval for mean difference; SD, standard deviation.

TABLE 2 Effect of splinting on trueness and precision

Measurement	Splinting	Mean ± SD [μm]	95% CI		p Value
			Lower	Upper	
Trueness	With GD	109.60 ± 22.28	-32.40	-18.17	<0.001*
	Without GD	140.00 ± 12.14	-46.63	-18.17	<0.001*
Precision	With GD	95.31 ± 25.15	-26.96	-14.25	<0.001*
	Without GD	122.27 ± 15.84	-37.07	-14.25	<0.001*

Abbreviations: 95% CI, 95% confidence interval for mean difference; SD, standard deviation.

*Significant ($p < 0.05$).

Measurement	Scanners	Mean ± SD [μm]	95% CI		p Value
			Lower	Upper	
Trueness	Core Precision	106.75 ± 22.38	-5.40	11.27	0.717
	3Shape Trios 4	112.15 ± 12.83	-11.21	11.27	0.717
	Core Precision	106.75 ± 22.38	-11.75	-31.08	<0.001*
	Model 1000	108.50 ± 27.45	-60.02	-19.48	<0.001*
	3Shape Trios 4	112.15 ± 12.83	-60.02	-19.48	<0.001*
	Model 1000	108.50 ± 27.45	-60.02	-19.48	<0.001*
Precision	Core Precision	95.45 ± 32.21	-14.27	2.53	0.112
	3Shape Trios 4	107.72 ± 12.34	-25.74	-8.94	0.002*
	Core Precision	95.45 ± 32.21	-25.74	-8.94	0.002*
	Model 1000	121.21 ± 17.38	-20.29	5.21	0.237
	3Shape Trios 4	107.72 ± 12.34	-20.29	5.21	0.237
	Model 1000	121.21 ± 17.38	-20.29	5.21	0.237

16 de marzo de 2021

PubMed ID: 34006068 PÁGINAS: 13-22, IDIOMA: INGLÉS
AlTarawneh, Sandra / Thalji, Ghadeer / Cooper, Lyndon

Prótesis dentales fijas de circonio monolítico soportadas por implantes de arcada completa: una revisión sistemática actualizada

Propósito: Actualizar una revisión sistemática existente que evalúa el desempeño clínico de las prótesis dentales fijas de circonio monolítico soportadas por implantes de arcada completa.

Materiales y métodos: La revisión se realizó de acuerdo con las pautas descritas en la declaración de Elementos de informes preferidos de revisiones sistemáticas y metanálisis (PRISMA). Se realizó una búsqueda electrónica utilizando las bases de datos PubMed, Science Direct y Cochrane Library para identificar estudios clínicos sobre prótesis dentales fijas de circonio monolíticas y de capas mínimas soportadas por implantes de arco completo. Se incluyeron estudios en humanos con un seguimiento medio de al menos 1 año y publicados en una revista revisada por pares.

https://onlinelibrary.wiley.com/doi/full/10.1111/clr.14411?samI_referrer

Clinical Oral Implants Research

WILEY

ORIGINAL ARTICLE

Full-Arch Digital Implant Impression Trueness: An In Vivo Study

Yogeshwar Mishra¹ | David G. Little² | Maria Bertha de Lencastre³ | Mikalita Abdulkader⁴ | Linda A. Little⁵ | Vivek J. Little⁶

¹Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ²Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ³Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ⁴Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ⁵Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ⁶Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA

Received: 22 January 2017 | Accepted: 15 October 2017 | Published online: 15 October 2017

Handling Editor: Dr. David G. Little

Keywords: digital impression; intraoral scanner; implant; impression; trueness

ABSTRACT Objectives: To evaluate the trueness of digital implant impressions taken with and without additional reference objects.

Material and Methods: A total of 100 implant impressions were taken with and without additional reference objects. The impressions were scanned with a digital scanner and the STL files were compared with the STL files of the original impressions.

Results: The highest trueness was observed in the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.

Conclusions: The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.

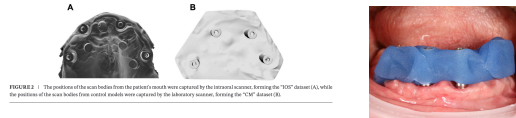


FIGURE 2 | A and B. The position of the wax bodies from the patient's mouth were captured by the intraoral scanner, forming the '3D' dental STL, while the position of the wax bodies from control models were captured by the laboratory scanner, forming the '2D' dental STL

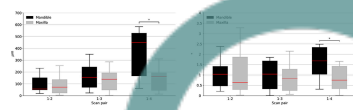


FIGURE 4 | Trueness (mm) for different implant types and groups. The chart compares the trueness of STL files generated from digital scans with the trueness of STL files generated from laboratory scans. The y-axis represents Trueness (mm) from 0 to 1.5. The x-axis shows different implant types and groups: 10 mm body, 10 mm head, 10 mm body and 10 mm head, 10 mm body and 10 mm head and 10 mm body and 10 mm head. The legend indicates 'Digital' (black bars) and 'Laboratory' (white bars).

Implant	Trueness (mm)	Standard deviation (mm)	Minimum (mm)	Maximum (mm)
10 mm body	0.15	0.05	0.05	0.25
10 mm head	0.15	0.05	0.05	0.25
10 mm body and 10 mm head	0.15	0.05	0.05	0.25
10 mm body and 10 mm head and 10 mm body and 10 mm head	0.15	0.05	0.05	0.25

JPD
THE JOURNAL OF PROSTHETIC DENT

DENTAL TECHNIQUE

Complete digital workflow in prosthesis for complete-arch implant rehabilitation

Panos Papaspyridakos, DDS, MS, PhD¹ | Yo-wei Chen, DDS, MS² | Rer Wael Att, DDS, Dr med dent, PhD³

¹Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ²Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ³Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA

Received: 22 January 2017 | Accepted: 15 October 2017 | Published online: 15 October 2017

Handling Editor: Dr. David G. Little

Keywords: digital impression; intraoral scanner; implant; impression; trueness

ABSTRACT Objectives: To evaluate the trueness of digital implant impressions taken with and without additional reference objects.

Material and Methods: A total of 100 implant impressions were taken with and without additional reference objects. The impressions were scanned with a digital scanner and the STL files were compared with the STL files of the original impressions.

Results: The highest trueness was observed in the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.

Conclusions: The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.

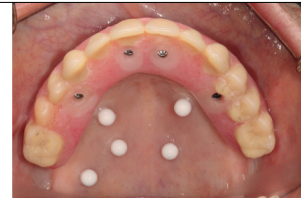


FIGURE 1 | Maxillary screw-retained abutment-level interim prosthesis before digital scanning. The image shows a maxillary arch with several white screw-retained abutments and a blue interim prosthesis.

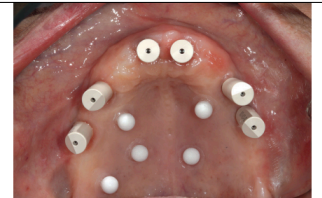


FIGURE 2 | Intraoral scan bodies connected before maxillary abutment-level complete-arch digital scanning. The image shows a maxillary arch with several white scan bodies connected by a blue interim prosthesis.

FIGURE 3 | STL files generated from digital scans. STL, standard tessellation language.

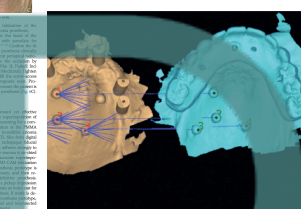


FIGURE 3 | STL files generated from digital scans. STL, standard tessellation language.

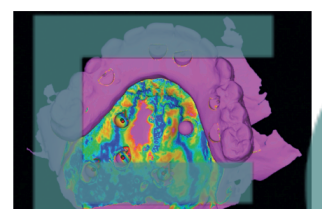


FIGURE 4 | STL file superimposition before import into CAD software. CAD, computer-aided design; STL, standard tessellation language.

JPD
THE JOURNAL OF PROSTHETIC DENT

DENTAL TECHNIQUE

Digital verification and correction of digital intraoral scan for fixed implant rehabilitation of edentulous arches: A clinical technique

Yogeshwar Mishra¹ | David G. Little² | Maria Bertha de Lencastre³ | Mikalita Abdulkader⁴ | Linda A. Little⁵ | Vivek J. Little⁶

¹Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ²Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ³Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ⁴Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ⁵Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ⁶Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA

Received: 22 January 2017 | Accepted: 15 October 2017 | Published online: 15 October 2017

Handling Editor: Dr. David G. Little

Keywords: digital impression; intraoral scanner; implant; impression; trueness

ABSTRACT Objectives: To evaluate the trueness of digital implant impressions taken with and without additional reference objects.

Material and Methods: A total of 100 implant impressions were taken with and without additional reference objects. The impressions were scanned with a digital scanner and the STL files were compared with the STL files of the original impressions.

Results: The highest trueness was observed in the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.

Conclusions: The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.

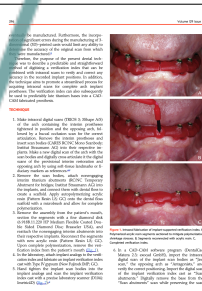


FIGURE 1 | Intraoral scan of the maxillary arch. The image shows a maxillary arch with several white scan bodies connected by a blue interim prosthesis.

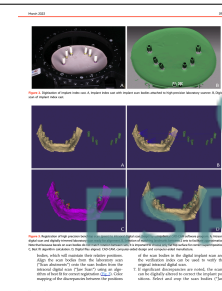


FIGURE 2 | STL files generated from digital scans. STL, standard tessellation language.

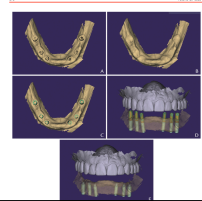


FIGURE 3 | STL file superimposition before import into CAD software. CAD, computer-aided design; STL, standard tessellation language.



FIGURE 4 | STL file superimposition before import into CAD software. CAD, computer-aided design; STL, standard tessellation language.

CLINICAL ORAL IMPLANTS RESEARCH

Accuracy of implant casts generated with optimized and non-optimized impression techniques for edentulous patients: an optical scanning study

Panos Papaspyridakos, DDS, MS, PhD¹ | Yo-wei Chen, DDS, MS² | Rer Wael Att, DDS, Dr med dent, PhD³

¹Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ²Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA; ³Department of Periodontology, University of Pittsburgh, Pittsburgh, PA, USA

Received: 22 January 2017 | Accepted: 15 October 2017 | Published online: 15 October 2017

Handling Editor: Dr. David G. Little

Keywords: digital impression; intraoral scanner; implant; impression; trueness

ABSTRACT Objectives: To evaluate the trueness of digital implant impressions taken with and without additional reference objects.

Material and Methods: A total of 100 implant impressions were taken with and without additional reference objects. The impressions were scanned with a digital scanner and the STL files were compared with the STL files of the original impressions.

Results: The highest trueness was observed in the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.

Conclusions: The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group. The STL files of the 10 mm body and 10 mm head group were more accurate than the STL files of the 10 mm body and 10 mm head group.



FIGURE 1 | Intraoral scan of the maxillary arch. The image shows a maxillary arch with several white scan bodies connected by a blue interim prosthesis.



FIGURE 2 | STL files generated from digital scans. STL, standard tessellation language.



FIGURE 3 | STL file superimposition before import into CAD software. CAD, computer-aided design; STL, standard tessellation language.



FIGURE 4 | STL file superimposition before import into CAD software. CAD, computer-aided design; STL, standard tessellation language.

DENTAL IMPLANTS

Maxillary Full Arch Restorations – Biological Complications: A Narrative Review Outlining Criteria for Long Term Success

Keywords: Patients receiving full arch implant-retained mandibular prosthesis require functional, esthetic, and long-term success. The importance of this review is to discuss the difficulty with implant maintenance, the prevalence of periimplant disease, and the improvement in biologic health when using a prosthesis that can be maintained to minimize plaque. The objective is to provide surgeons with a reference to optimize surgical procedures that can result in improved hygiene and long-term maintenance, as well as acceptable functional and esthetic goals.

Methods: PubMed.gov was the information source. Studies reviewed included 1990-2002. Inclusion criteria included only articles in journals indexed in PubMed.gov. The reports excluded were case reports, reports that only included biological material, and articles without a statistical analysis to generate meaningful conclusions. Biological complications included bone loss, fracture difficulty, endosteitis and osteomyelitis, the incidence of peripartumitis, and how complications related to patient co-morbidities. Data collected included outcomes of the study including statistical significance.

Results: The search identified articles for review using articles which included full and partial orthodontic (n = 736), long-term success with full and partial orthodontic (n = 225), orthodontic full and partial orthodontic (n = 102), and complications with full and partial orthodontic (n = 283). From the search, 53 articles were excluded that violated the inclusion criteria. Factors found to be significant contributors to orthodontic complications included bone loss and periodontal disease, difficulty with daily hygiene access, plaque and bio-film coverage, and the need for continued maintenance for long-term long-term follow-up.

Conclusion: The surgeon needs to place the incision to allow full secondary peristalsis to be initiated and with full access to the implants for maintenance, which should decrease the probability of biological complications. With excellent maintenance full oral implant movements can have limited peristaltic disease.

© 2021 American Association of Oral and Maxillofacial Surgeons
J Oral Maxillofac Surg 81:1124-1134, 2021

The clinical problem addressed in this systematic review is the presence of postoperative disease that occurs with the presence of such co-morbidities.

This review uses the literature to evaluate the nature of biological complications on implants placed to support a full-arch prosthesis. This article reviews evidence in the literature that can be utilized by clinicians to increase long-term success found with decreasing postoperative errors, inflammation, and bone loss. Unfortunately, very few reports are accurate.⁴ Prostheses may need repair or revision over the time they are utilized by the patient. The incidence of

David Panton, MD, PhD, Clinical Professor, GGI School of Medicine, Department of End and Thoracic Surgery, New Orleans, LA David H. Blockstein, Jr, Block has a financial relationship with A. Nat. Inc., Jansie, P., and J. Anononon, Inc., Jansie Block, Ltd. All authors do not have any relevant financial relationships with a commercial interest.	Address correspondence and reprint requests to Dr Block, GGI Health Science Center, 1145 General, Memorial Hill, Astoria, LA 70521-0001; email: david.block@ggi.edu Received March 8, 2015 Accepted May 17, 2015 DOI: 10.1016/j.jamcollsurg.2015.05.004 Copyright © 2015 by American College of Surgeons
--	---

CLINICAL IMPLANT DENTISTRY
and Related Research

Prevention of peri-implant disease in edentulous patients with fixed implant rehabilitations

Marta Revilla-León DDS, MSD, PhD^{1,2,3} | Burak Yilmaz DDS, PhD^{4,5,6} |
John C. Kois DMD, MSD^{2,7,8} | Wael Att DDS, Dr Med Dent, DMD, PhD⁹

Abstract
Objectives: To provide an overview about the current approaches to p

³Department of Prosthodontics, Tufts University, Boston, Massachusetts, USA

Abstract

Objectives: To provide an overview about the current approaches to prevent peri-implant diseases in edentulous patients with complete-arch implant-supported prostheses, and to review the clinical applications of the latest digital technologies for implant prosthodontics.

odontology

e, and patient
stogrammetry s
implant positio

AB, Ortega R,
evilla-León M.

ARTISTS

JOURNAL OF
PROSTHODONTICS
Implant, Esthetic, and Reconstructive DentistrySpecial Issue:
Digital Scans in Prothodontics

Editor in Chief: Prof. Dr. Ruth Muri
Guest Editor: Prof. Dr. Marta Revilla-León

Article 11

Accuracy, scanning time, and patient satisfaction of stereophotogrammetry system for acquiring 3D dental implant positions: A systematic review.

Gómez-Polo M, Barmak AB, Ortega R, Rutkunas V, Kojs JC, Revilla-León M.

ACPD | AMERICAN COLLEGE OF
PROSTHODONTISTS

JOURNAL OF
PROSTHODONTICS

odontology

e, and patient
stogrammetry s
implant positio

AB, Ortega R,
evilla-León M.

ARTISTS

1. Introduction

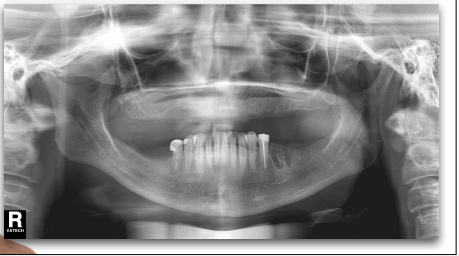
Owing to the impact of COVID-19, digital dental technologies have undergone rapid advancements. The global market share of *terrestrial* scanners (2016), which was valued at \$382.52 million in 2020, is projected to reach \$875.46 million by 2030, growing at a compound annual growth rate of 18.6% from 2020 to 2030 [1]. The growing popularity of digital dentistry can be attributed to its role in efficient diagnosis and

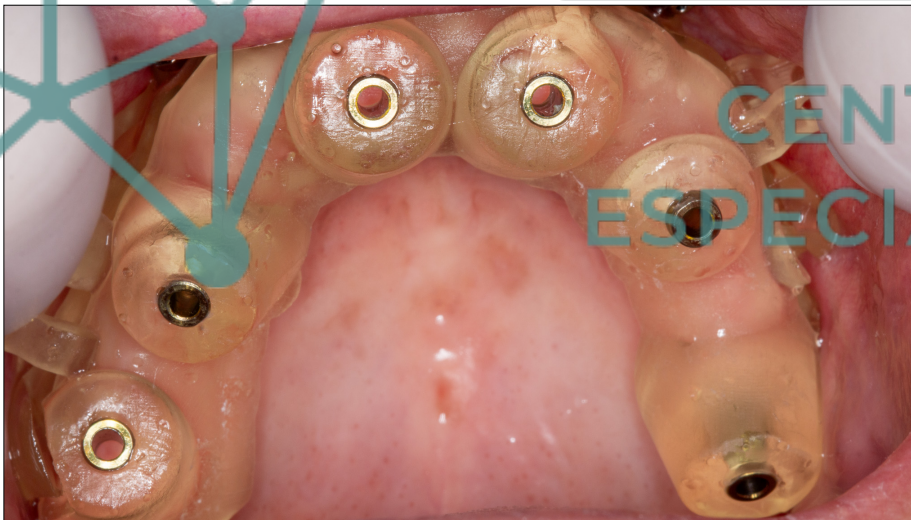
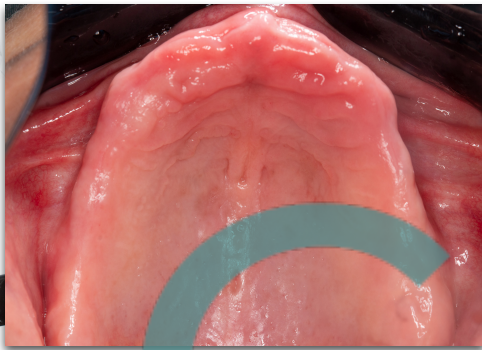
* Corresponding author at Postal address: Department of Psychiatry, Semmelweis University, Szentkirályi ucta 47., 1088 Budapest, Hungary.
E-mail address: borbaly@psd.com (J. Borbaly).



Escaner Facial y PF3 Zirconia

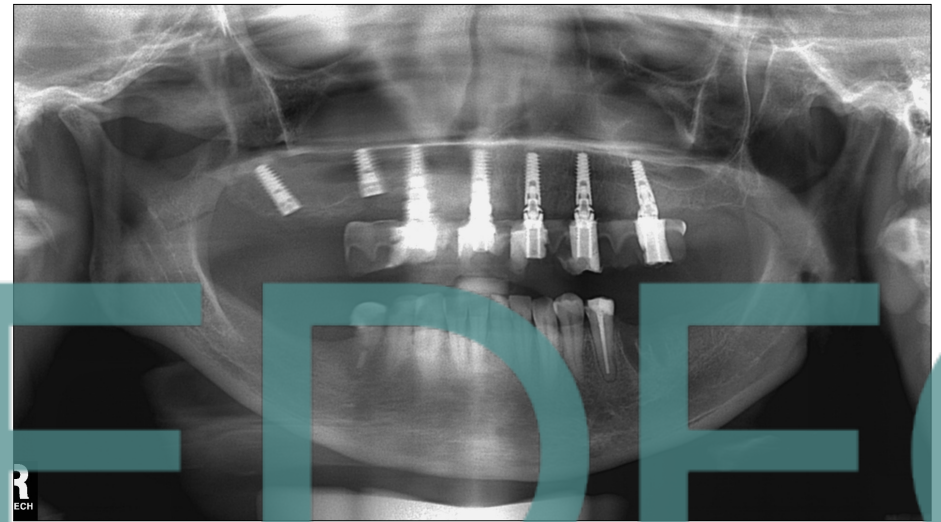
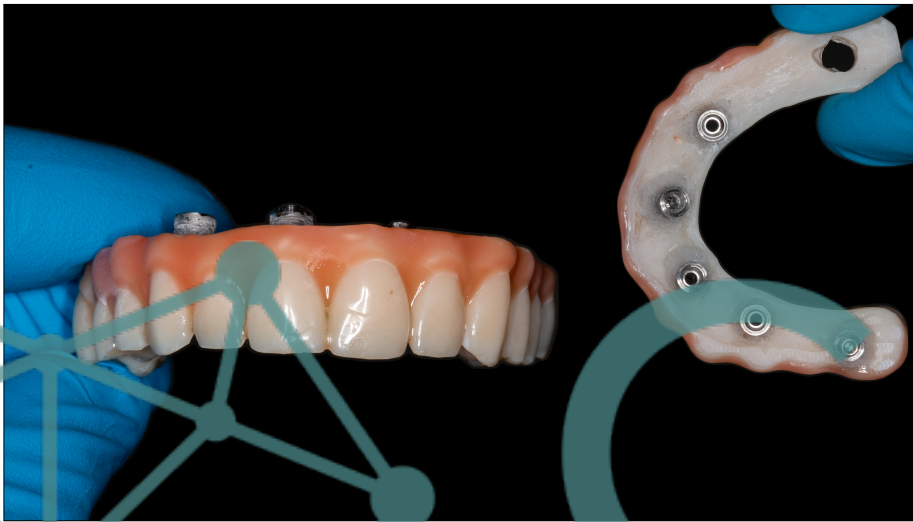
CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG





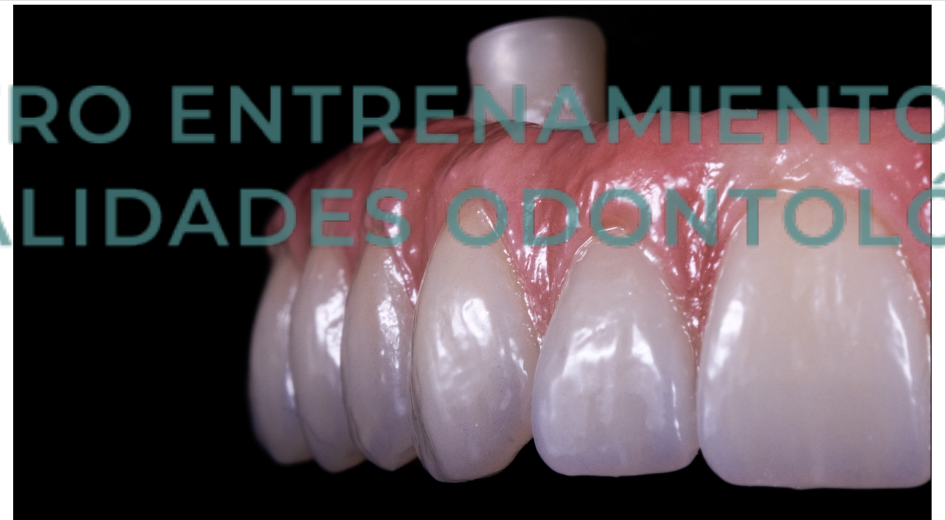
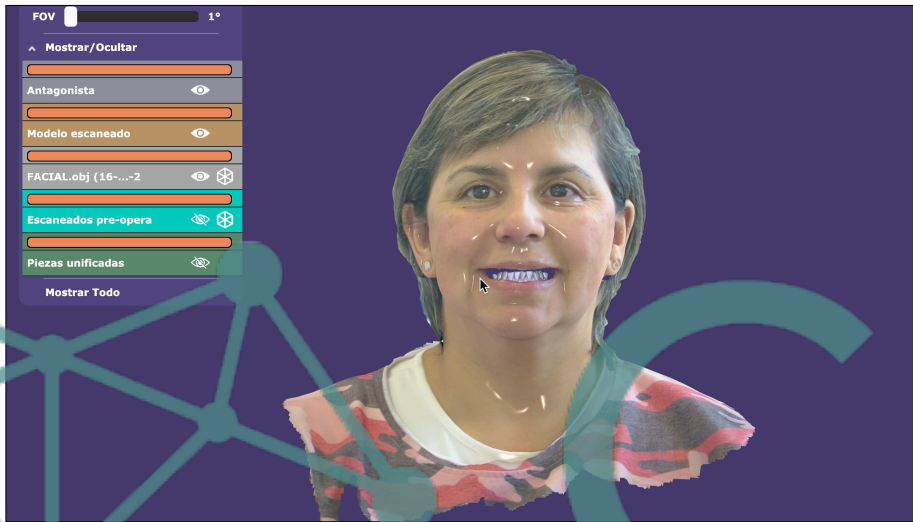
CEDDEC

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



CEDDEC

CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG



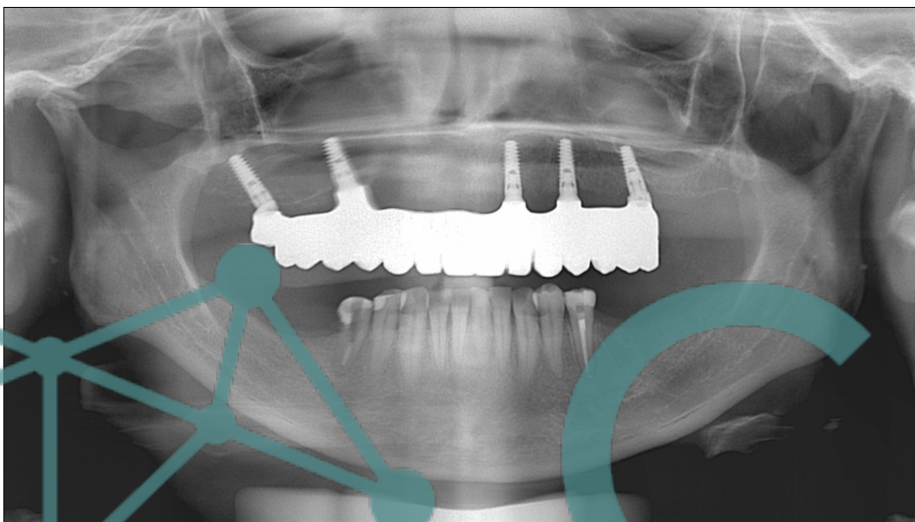
CEDEO



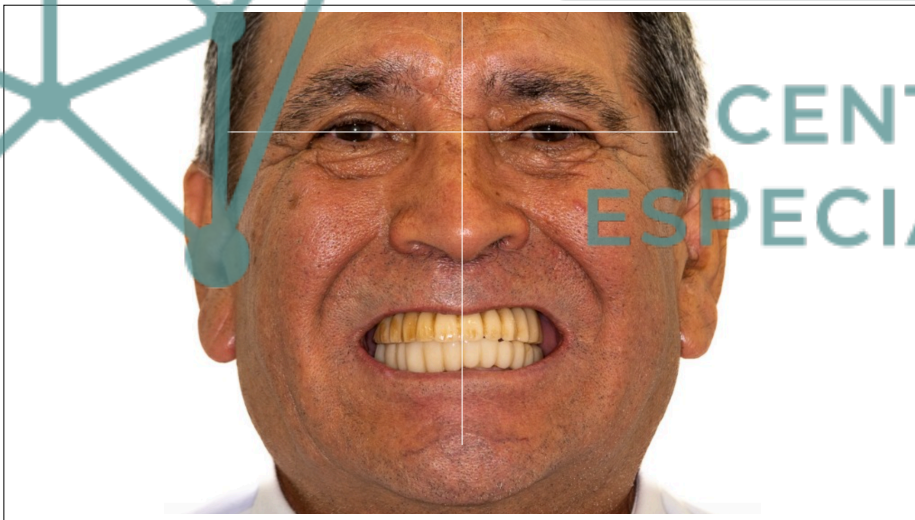
CENTRO ENTRENAMIENTO DE ESPECIALIDADES ODONTOLÓGICAS



CEDEO
CENTRO ENTRENAMIENTO DE
ESPECIALIDADES ODONTOLÓGICAS



CEDDEO



CENTRO ENTRENAMIENTO D
ESPECIALIDADES ODONTOLÓG