

Issue 007 | Nov 2023

QUARTERLY MAGAZINE  
HONG KONG & MACAU EDITION



## LIFESTYLE

Coffee: A Journey Through  
The Rich Tapestry Of Culture

**Durable, Contemporary  
Cementation of  
Lithium-Disilicate  
Crowns and Veneers**

PROGRESSIVE

**2-STEP**  
CLEAR ALIGNER  
SOLUTION

# THE RISE OF THE ROBOTS:

Should Implant Surgeons Be Afraid?



**HKU LAUNCHES**  
Free Treatment Program for  
Periodontal Disease Patients  
Benefiting Hundreds of Individuals



# TAKE A BREAK SIT BACK Relax

## What Is DENTAL DIARIES?

Practicing dentistry at the highest standards today is a challenge. As dentists we have to stay on top of a rapidly changing science, decide among growing technological innovations and new products and serve patients with ever changing needs and expectations. All these, while striving to maintain work-life balance in difficult times for all can be tough and it is no surprise that dentistry is among the most stressful professions.



At the Dental Diaries, we aspire to support dentists of Hong Kong and Macau on every step. Every quarter, our editorial team will gather the most up-to-date news in the dental field, short scientific articles and case studies, together with lifestyle information, suggestions and ideas to balance a busy working life with some fulfilling personal time. We also want to foster a network, by sharing messages, news and classified ads for the local dental community.

*We hope that every time you receive the latest Dental Diaries, you will not only gain professional knowledge, but it would also make your break a little bit more relaxing!*

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## UPCOMING COURSES

Hosted by:  Center of Dental Education



### Lecture + Hands-on

## Straumann Implants Essentials: Starting Your Journey in Implant Dentistry

**SPEAKER** Dr. Hui Sheung Yu, Bosco  
Specialist in Oral and Maxillofacial Surgery  
BDS(HK), MDS(OMS)(HK), MOMS RCSEd, FCDSHK(OMS), FHKAM(Dental Surgery)

**DATE & TIME** | Module 1: 7<sup>th</sup> Nov 2023, 7:00 – 10:00 P.M.  
Module 2: 22<sup>nd</sup> Nov 2023, 7:00 – 10:00 P.M.  
Module 3: 6<sup>th</sup> Dec 2023, 7:00 – 10:00 P.M.  
Module 4: 20<sup>th</sup> Dec 2023, 7:00 – 10:00 P.M.

**FEE** HK\$6,800

**VENUE** 17/F, CEO Tower, 77 Wing Hong Street, Cheung Sha Wan, Kowloon, HONG KONG



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### Webinar

## 2023 ClearCorrect Online Masterclass, Webinar 10 - Hybrid Treatments: a piece of the future

**SPEAKER** Dr. Ingrid Ledra & Dr. Gabriel Dolci

**DATE & TIME** 8<sup>th</sup> Nov 2023 | 7:30 - 9:00 P.M. HKT

**FEE** FOC

**VENUE** ZOOM



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### Overseas Program

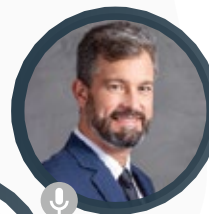
## Neodent World Tour in Kuala Lumpur

**SPEAKER** Dr. Geninho Thomé  
Dr. Sergio Bernardes  
Dr. Misagh Habibi

**DATE** 1<sup>st</sup> Dec 2023

**FEE** Explore the Implant Package with Peak Dental Solutions HK

**VENUE** Mandarin Oriental Kuala Lumpur Malaysia



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## Lecture + Hands-on

## Guided Immediacy: Master The New Norm In Implant Dentistry!

**SPEAKER** Dr. Nikos Mattheos  
DDS, Odont, Dr.

**DATE** 10<sup>th</sup> Dec 2023

**FEE** HK\$8,800 HK\$7,500 early bird ends on 31<sup>st</sup> Oct 2023

**VENUE** 17/F, CEO Tower, 77 Wing Hong Street, Cheung Sha Wan, Kowloon, HONG KONG



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## Lecture

## Guided Immediacy: Master The New Norm In Implant Dentistry!

**SPEAKER** Dr. Nikos Mattheos  
DDS, Odont, Dr.

**DATE** 10<sup>th</sup> Dec 2023

**FEE** HK\$7,500 HK\$6,000 early bird ends on 31<sup>st</sup> Oct 2023

**VENUE** 17/F, CEO Tower, 77 Wing Hong Street, Cheung Sha Wan, Kowloon, HONG KONG



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## Mentorship

## Straumann Implants Essentials: Starting Your Journey in Implant Dentistry

### Module 5 - Mentorship for Single Implant Placement

**SPEAKER** Dr. Hui Sheung Yu, Bosco  
*Specialist in Oral and Maxillofacial Surgery*  
BDS(HK), MDS(OMS)(HK), MOMS RCSEd, FCDSHK(OMS), FHKAM(Dental Surgery)

**DATE** Dec 2023 – Feb 2024

**FEE** HK\$12,000



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## Webinar

## 2023 ClearCorrect Online Masterclass, Webinar 11

### - Clearpilot as a powerful tool for post-ortho restorations and implants

**SPEAKER** Dr. Gabriel Dolci

**DATE & TIME** 13<sup>th</sup> Dec 2023 | 7:30 - 9 P.M. HKT

**FEE** FOC

**VENUE** ZOOM



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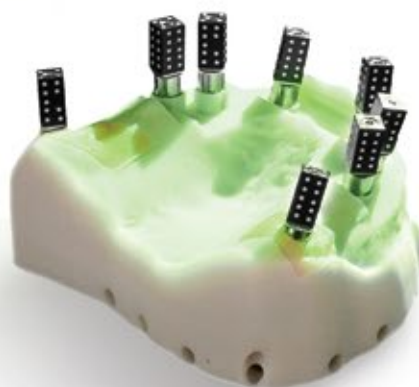
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## MAIN STORY

# THE RISE OF THE ROBOTS: SHOULD IMPLANT SURGEONS BE AFRAID?

Dr. James Chow<sup>1</sup>Dr. Yiqun Wu<sup>2</sup>Pro. Nikos Mattheos<sup>3,4</sup>

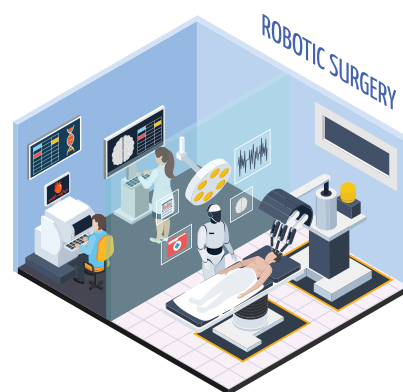
“

Robotic Surgery, once a theme of science fiction, entered the practice of medicine about two decades ago. Implant dentistry could not be an exception and six years after the first robotic placement of a dental implant, commercially available systems now promise to place implants accurately and tirelessly in your patients. But is this a real gamechanger or mostly hype? How close are we to turning point in implant surgery as we know it? Will the implant surgeon of the future be a... machine?

Dental Diaries looked for some answers for you! We invited three pioneers of computer assisted implant surgery to explain the present science in robotic surgery and discuss the impact in the future of implant dentistry!

## ROBOTIC SURGERY AND MEDICINE

Robotic surgery, started to enter scientific application in the mid-eighties of the previous century, through research on telesurgery in war and in space exploration. As space exploration was expanding with potential permanent placements of humans in new frontiers such as the International Space Station and remote commands, there was a great interest for the development of telemedicine services, including tele-surgery. Initial attempts of telesurgery however, were greatly limited by infrastructure problems such as signal transmission and delay and progress was slow for the first decades. The COVID-19 pandemic, catalysed a rise of medical and surgical robotic applications, as innovation was pushed by the urgent need to prevent transmission of the viral disease and reduce exposure of the frontline healthcare providers to the contagious environment.



Today, the surgical robot is an established reality in fields like orthopaedics and neurosurgery and is rapidly becoming a disruptive innovation in several fields of surgery and healthcare.

Currently, medical robots can be categorised in six levels based on their autonomy of operation: **from the lowest levels of 1) “no autonomy” and 2) “assistance”, intermediate levels of 3) “task”, 4) “conditional” or 5) “high” autonomy to the highest level of 6) “full automation”** [Yang et al 2017] (Figure 1). At present the available robotic systems specific for implant surgery are either robot-assisted [level 2: assistance] or autonomous with task autonomy [level 3]. The first category, often referred to as remotely operated or “tele-controlled” type of surgical robots, is widely applied in orthopaedic surgery and the surgeon has control of the robotic arms during the whole operation through a console by means of bimanual wrist manipulation. Da Vinci was the first robotic system which received US Food and Drug Administration (FDA) approval in 2000

1. Brånnemark Osseointegration Centre, Hong Kong, Hong Kong SAR-China.

2. School of Medicine, 9th People's Hospital, Shanghai Jiao Tong University, Shanghai, China

3. Oral and Maxillofacial Surgery, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

4. Department of Dental Medicine, Karolinska Institute, Stockholm, Sweden  
contact: nikos@mattheos.net

for laparoscopic surgery, while the same system was approved in 2009, for transoral procedures in all benign diseases, selected malignant lesions and surgical management of obstructive sleep apnea [Wu et al 2019].

Both remotely operated as well as task autonomous robotic applications currently exist in implant dentistry. The autonomous robotic surgery is an extension of the optical tracking technology of the dynamic CAIS coupled with the robotic arm, while haptic technology is utilised in the operator controlled robotic system. While optical tracking is vision-based, in haptic guidance a robotic arm assists in precise and automatic positioning of the dental handpiece by attaching a separate robotic extension to the patient's jaw for coordinate measurement.

In the autonomous robotic category however, implant robots employ a robotic arm to carry a handpiece and conduct the osteotomy and dental implant placement under human supervision but with no active guidance. Thus, autonomous robotic CAIS could combine the benefits of the static and the real-time image-based guidance of the dynamic CAIS. The robotic arm is a steady and precise mechanism which can eliminate any human operator related limitations by ergonomics, reduced field of vision, fatigue or tremor and thus increase precision.

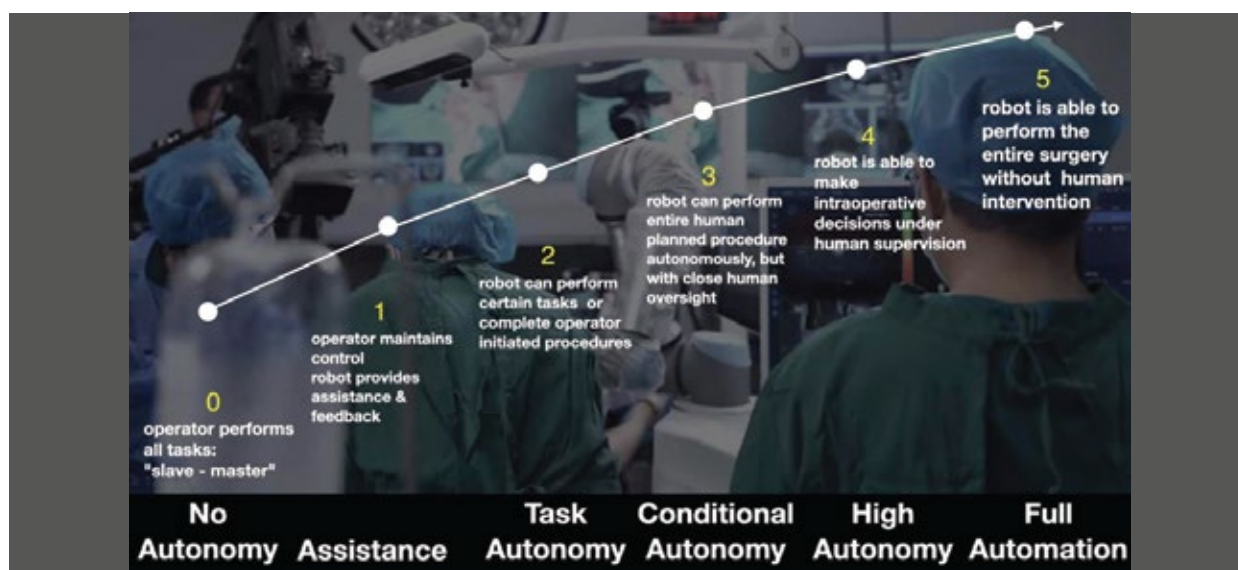


Figure 1. The six levels of autonomy of medical robotic systems as described by Yang et al 2017. Currently the majority of medical robotic applications remain in the levels 0-1, while implant surgery robotics exist already in the level 2 (task autonomy).

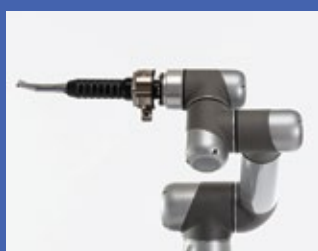


Figure 2. Detail of the robotic arm with the handpiece and mount for the osteotomy drill of the Yakebot.



Figure 2. Two typical "slave-master" robotic systems a) for orthopaedic surgery and b) for endoscopic procedures. Both systems are operated by the surgeon with fine pen or grip style remote control devices.

## WHAT IS THE CURRENT STATE OF ROBOTICS IN IMPLANT SURGERY?

Robotic Implant Surgery is a disruptive innovation even by the standards of medical robotics. Unlike the great majority of robotic applications in medicine which remain mainly in the "slave – master" level of autonomy, dental implant robots have "leapfrogged" straight to task autonomy (Figure 2), being currently in the forefront of development for the entire field. The world's first autonomous dental implant robotic placement, was successfully conducted in 2017 by Peking University (Beijing, China) and the Fourth Military Medical University Hospital (Xi'an, China). Commercial launch of the robotic system followed in 2021 as Yakebot (Yakebot Technology Co Ltd, Beijing) (Figure 3). According to the manufacturer, the purpose of producing an autonomous robot for dental implant surgery was to minimize any human errors during surgery and to address the shortage of qualified dentists in China. Yakebot system consists of a serial robotic arm, a navigation system, a dental implant handset and the DentalNavi (Yakebot Technology Co Ltd, Beijing) software

[Figure 3a-c]. A second robot was registered in China for autonomous placement of dental implants in 2019 under the name Remebot [Beijing BaiHuiWeiKang Co., LTD], which has also by now published clinical documentation [Figure 4].

In the United States, a dental implant robotic system called YOMI received FDA-approval in 2017. YOMI is a robotic system using haptically guided stereotactic robotic technology, which can direct the osteotomy based on the planned preoperative trajectory. YOMI delivers physical guidance by constraining the drill position, orientation, and depth, while simultaneously preventing deviation of the surgeon's hand by means of vibrational feedback. It is based on the physical human-robot interaction to ensure safe movement of the robotic arm during operation; thus, it could be categorised as robot-assisted placement [assistance level].

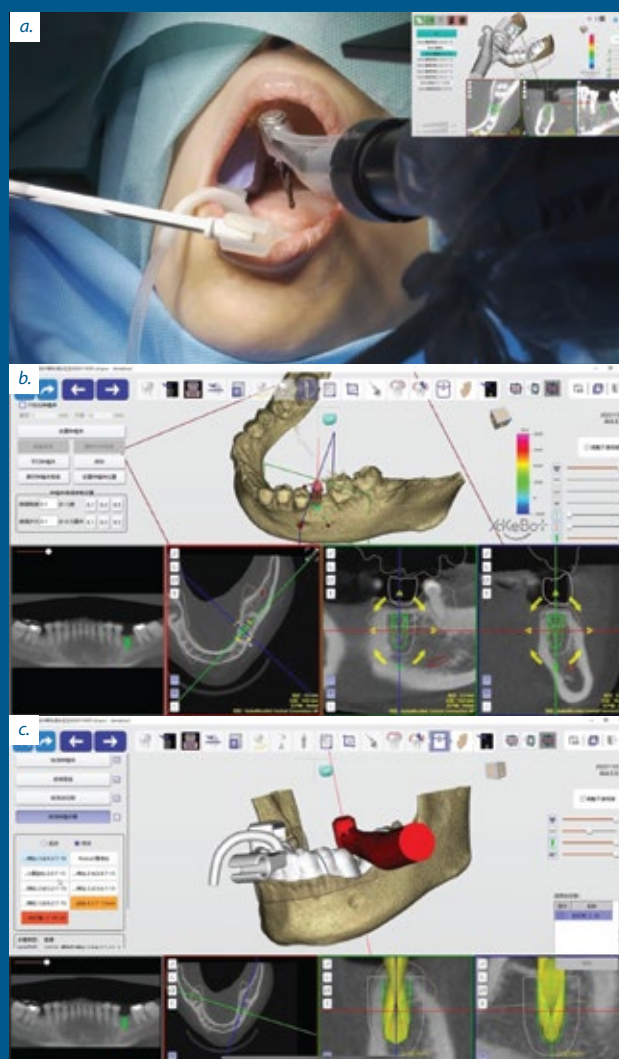
## WHAT IS THE CLINICAL EVIDENCE OF ACCURACY OF ROBOTIC IMPLANT PLACEMENT?

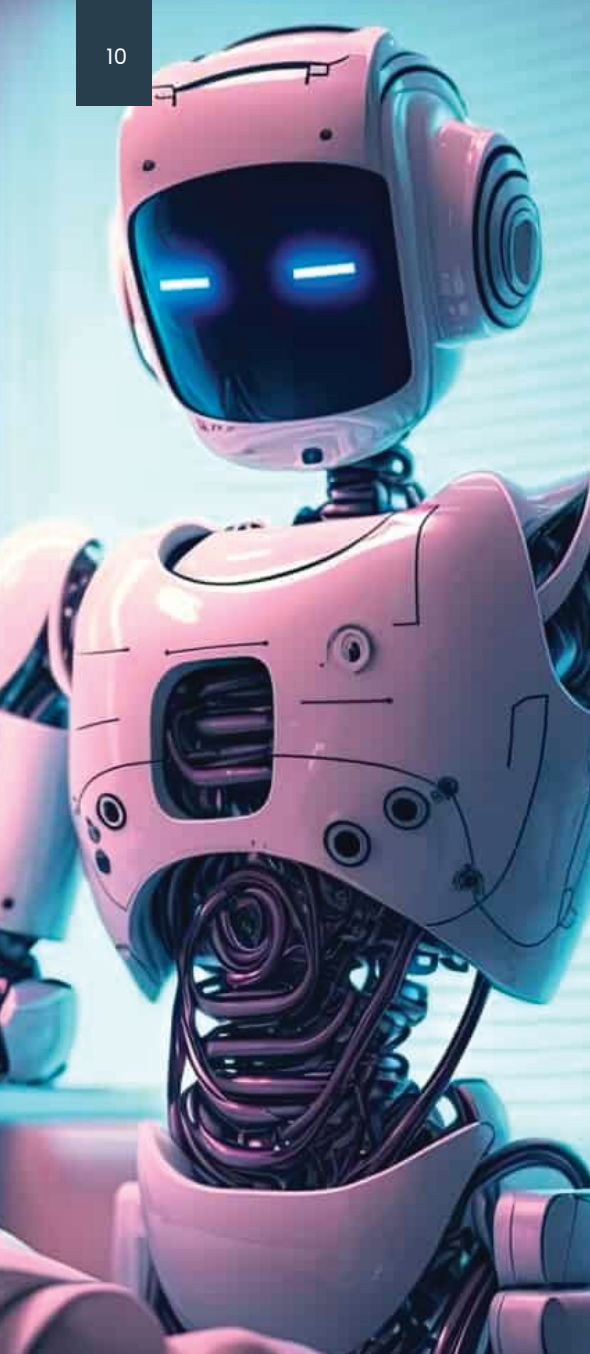
Autonomous robotic implant surgery is still at an infancy, albeit certainly beyond the proof-of-concept stage. Apart from numerous in-vitro and simulation studies, clinical evidence is presently available in the form of case studies [Moser 2020, Yang et al 2022] or series [Chen et al 2023, Yang et al 2023, Bolding and Reebye 2022], including complex edentulous cases of immediate placement and loading.

Yang et al 2023 in a case series with autonomous robotic placement of single implants in 10 patients with the system Remebot, reported a mean overall deviation of 0.74 mm at platform, 0.73 mm apical 1.11° in the angle. Similarly, Chen et al 2023 utilised a robotic arm to place 31 implants in 28 partially edentulous patients, documenting a mean angle deviation of  $2.81 \pm 1.13^\circ$ , while the 3D deviations at the implant shoulder and apex were  $0.53 \pm 0.23$  mm and  $0.53 \pm 0.24$  mm respectively. Such levels of accuracy would be lower than the current benchmarks with human-operated static and dynamic CAIS [Pellegrino et al 2021] and comparable with the accuracy reported from the few studies combining static and dynamic CAIS in single gaps [Yotipibulwong et al 2023] and edentulous patients [Tahmaseb et al 2018,] respectively. The first case of full arch implant rehabilitation with immediate loading is now reported also with autonomous robotic system. Yang et al 2022 utilised Remebot to place six implants in the edentulous maxilla and to immediately load them with a full arch prosthesis. The process was more complex and required a personalized mucosa-supported template with an optical positioning marker and a tooth-supported guided template, which were fixed together with metallic pins. The template with the positioning marker was secured to the patient jaw using bone screws. The implants were placed in the maxilla with mean coronal and apical deviations of  $0.59 \pm 0.24$  mm and  $0.61 \pm 0.23$  mm respectively, while the mean angular deviation was  $0.89 \pm 0.38$  degrees.

Bolding and Reebye 2022, assessed the accuracy of implant placement in five patients with the YOMi haptic robotic system. They assessed a total of 38 implants placed in 8 edentulous dental arches, showing an average global angular deviation of  $2.56 \pm 1.48$  degrees, and deviation at the entry and apex of  $1.04 \pm 0.70$  mm and  $0.95 \pm 0.73$  mm respectively. Such accuracy would be at least as good as results achieved with human operated static or dynamic CAIS in similar cases.

Figure 3 a) The autonomous robotic arm (Yakebot Technology Co Ltd, Beijing) controls the implant drill through an optical tracking system similar to the one used for human operated dynamic CAIS. A tracker with fiducial markers is firmly attached in the operated jaw and can be seen in the left. b,c) Proprietary navigation software is used to project the planned implant position on the patient's anatomy and guide the osteotomy in a 3dimensional space.





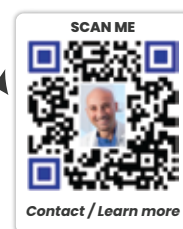
## FUTURE DIRECTIONS

About five years after the first autonomous robotic dental implant placement and this technology has achieved remarkable progress with two types of robotic systems already commercially available in US and China. Although the clinical application is currently limited, the emerging evidence suggests the technology is already beyond the “proof of concept”. Many witnessed the first robotic implant placement through the news as a “publicity stunt” with little if at all impact in the way we will be practicing implant dentistry. Yet the fast pace of progress of this technology has taken many by surprise. Case series have demonstrated accuracy of placement which appears higher than this achieved by human operators, even when CAIS is utilised and in complex cases such as the edentulous arch. Nevertheless, the high costs and complexity of this technology, as well as the need for human intervention [task autonomy only] and direct supervision currently limit its application into mainstream practice. However, upcoming developments and improvements in the technology might soon change this.

The robotic arm remains a flexible and precise operator. Adding functionality and procedures to the robotic arm is just a matter of installing a software update. In the future, expanding the use of robotic arms to other surgical and non-surgical procedures could increase the indications and thus the benefits of such a system for the whole clinic. A robotic arm could easily be programmed to use an optical scanner for example, acquiring patient intraoral scans in an unmanned scanning station. A robotic device for crown preparations of natural teeth is already developed and validated in-vitro [Yuan et al 2016], a development which could be the next frontier within reach of clinical application. Coupled with advances in machine learning and artificial intelligence, new possibilities could emerge for autonomous robotic surgical applications, allowing wider implementation in implant dentistry.

For now, an experienced implant surgeon remains irreplaceable; and this will not change in the foreseeable future. However, a future where robotic machines will have an ever-increasing role in surgical procedures is already visible!

To communicate with the authors, send your thoughts, comments and find out more you can use the QR code below.



### Conflict of interest

The authors declare no conflict of interest and no commercial relation or benefits from any of the robotic systems and commercial products mentioned in this article.

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Guang-Zhong Yang, James Cambias, Kevin Cleary, Eric Daimler, James Drake, Pierre E. Dupont, Nobuhiko Hata, Peter Kazanzides, Sylvain Martel, Rajni V. Patel, Veronica J. Santos, and Russell H. Taylor. Medical robotics—Regulatory, ethical, and legal considerations for increasing levels of autonomy *Sci. Robot.*, 2 (4), eaam8638. DOI: 10.1126/scirobotics.aam8638

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# CASE STUDIES

## Progressive Two-Step Clear Aligner Solution

### Progressive Force Concept

A single material aligner system with the same thickness for all aligners can sometimes create too much force for individual teeth, leading to increased chance of root resorption and unpredictable movements. A combination of 1 soft and 1 hard aligners contribute around 0.6mm tooth movement. Elkholy and Lapatki have concluded from their study that the applied force can be effectively reduced by using a sequence of progressive thickness aligners and ensures a relatively constant load increase for each individual set -up step<sup>2</sup>. It is important to note that treatment time is unaffected because a larger range of movement is able to be accomplished compared to using a single thickness aligner system. Compared with the principle of leveling and alignment in fixed appliance therapy<sup>1</sup>. This unique Progressive Force Concept has been proven to make orthodontic tooth movements very predictable as you will also experience.



|                                                                                                | Days per Step* | Aligner Thickness | Benefits                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------|----------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>SOFT</b>  | 7 days         | ~0.5mm            | <ul style="list-style-type: none"> <li>Eases the patient in with greater comfort</li> <li>Flexible and easy to insert / remove</li> <li>Stretches ligaments</li> <li>Stimulates bone remodelling</li> </ul>                                                    |
|  <b>HARD</b> | 7 days         | ~0.7mm            | <ul style="list-style-type: none"> <li>Increased rigidity for programmed movement</li> <li>Holds teeth in place while remodelling occurs</li> <li>More sustainable without material distorting or weakening</li> <li>Protects against micro-relapse</li> </ul> |

\* Each step's changing time may vary at the dentist's discretion, subjected to good compliance and fit as the patient progresses.

Reference:

1. Schupp, W., & Haubrich, J. (2023). Aligner Orthodontics and Orofacial Orthopedics (2nd ed.). Quintessence Publishing.

2. Elkholy, F., & Lapatki, B. G. (2018). Recommendation of a novel film-thickness sequence, 0.4, 0.5 and 0.75 mm, for aligner systems. Journal of Aligner Orthodontics, 2(4), 295–304.

## CASE 1

### PATIENT INFORMATION

Age: 33 Gender: Female

### CASE DESCRIPTION

- Moderate Crowding
- Slight Deepbite
- Slight Midline Discrepancy

### TRIOCLEAR™ TREATMENT

Complete

### TOTAL TREATMENT TIME

11 months

### RETENTION

Maxillary Ecodont™ Retainers  
Mandibular Ecodont™ Retainers

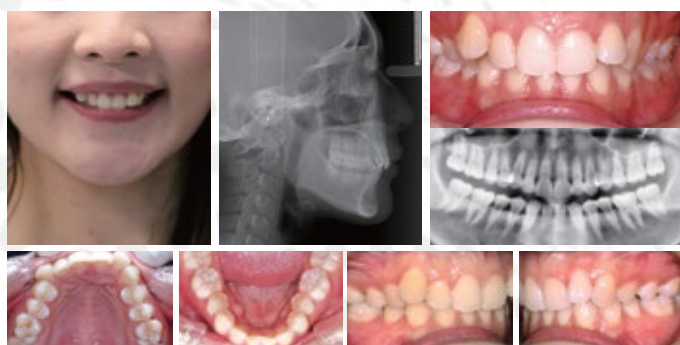
### COMMENTS

- In this treatment, no attachments were used
- Patient was compliant with chewing exercises

### RESULT ACHIEVED

- Functional canine guidance on both sides
- Deepbite improved
- Midline corrected
- Proper axial inclination of incisors
- Arches aligned and coordinated
- Alignment of both arches through derotation and IPR
- Aesthetic smile line was achieved

### Pre-Treatment



### Treatment in Progress



# LET YOUR SMILE SHINE



## Post-Treatment



## CASE 2

### PATIENT INFORMATION

Age: 18 Gender: Male

### CASE DESCRIPTION

- Anterior Crossbite
- Minor Crowding

### TRIOCLEAR™ TREATMENT

Complete

### TOTAL TREATMENT TIME

12 months

### RETENTION

Maxillary Ecodont™ Retainers  
Mandibular Ecodont™ Retainers

### RESULT ACHIEVED

- Anterior crossbite corrected
- Class I canine and molar achieved
- Good occlusion achieved
- Guided eruption of 15 into ideal space

### COMMENTS

- Aligner coverage was extended to around 5mm on anterior palatal to exert more force to correct the crossbite and expand arch anteriorly
- Only 2 attachments in the molars were needed as sufficient retraction was achieved with gingival coverage of aligners

## Pre-Treatment



## Treatment in Progress



## Post-Treatment





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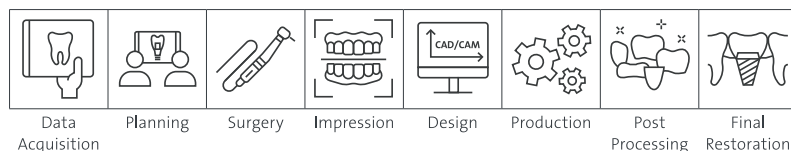
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2023

# HKU LAUNCHES

## FREE TREATMENT PROGRAM

### FOR PERIODONTAL DISEASE PATIENTS

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Periodontal disease, a global concern affecting approximately 740 million people or 11% of the world's population, has a significant impact on Hong Kong's adult population. Between 10% to 20% of adults in HK suffer from severe gum disease (periodontitis), which adversely affects their chewing ability, dietary intake, general health, self-esteem, and overall quality of life. The loss of periodontal tissue is irreversible, and the cost of treatment can be prohibitive, especially for the underprivileged.

To address this issue, the Faculty of Dentistry of The University of Hong Kong (HKU) launched the Azalea Gum Treatment Project on September 22, 2023. This initiative, supported by the Division of Periodontology & Implant Dentistry and the Institute for Advanced Dentistry – Multi-Specialty Clinic (IAD-MSC) at HKU, aims to provide free, comprehensive dental treatment to at least 100 underprivileged patients suffering from severe gum disease. The IAD-MSC serves as a centre of excellence for managing complex and severe oral conditions.

The Azalea (1972) Endowment Fund has contributed HKD 11 million as the seed funder for HKU Dentistry's Smiles-For-All Advanced Dentistry fund, supporting the project. Additionally, global dental industry leaders have pledged in-kind support to further enhance the project's social impact. The Straumann Group will provide premium dental implants, the Modern Dental Group will offer dental laboratory services, and other noteworthy supporters include Ray HK and Dentsply Sirona.



The project's primary goal is to help patients manage their condition and inflammation through treatment, prevent further deterioration, repair the consequences of periodontal disease such as tooth loss and displacement, and prevent recurrence through regular follow-ups.

The Azalea Gum Treatment Project specifically targets adult patients with severe gum disease. Eligible applicants are those currently receiving Comprehensive Social Security Assistance and living in public rental housing.

On September 22, a press conference was held to announce the details of the Azalea Gum Treatment Project. Professor Thomas Flemmig, Dean of the Faculty of Dentistry at HKU, introduced the SmilesForAll Project, while Dr. George Pelekos and Dr. Chris Fok, Project Leads of the Azalea Project, discussed gum disease awareness in Hong Kong. Mr. Gerhard Zielinski, Director of IAD-MSC, showcased the IAD-MSC facilities, and Mr. Wong Kai-man, Chairman of the Management Board of Azalea (1972) Endowment Fund, alongside Mr. Gilbert Achermann, Chairman of the Board of the Straumann Group, discussed their respective contributions to the project. In a heartwarming gesture, 100-year-old Madam Fung, a patient treated under another Azalea Fund project, appeared to present a souvenir to KaiMan as a token of appreciation for the fund's generous support.

# ALL-ON-4 IMPLANT CLINICAL RESIDENCY PROGRAM: A JOURNEY OF LEARNING & DISCOVERY IN AUSTRALIA



*After three years of pandemic-related restrictions, I was thrilled to participate in the All-on-4 Implant Clinical Residency Program organized by the esteemed Peak Dental team in Melbourne, Australia. As a participant in the three-day intensive course, I was impressed by the program's well-structured organization and the exceptional expertise of Dr. Alex Fibishenko and his team.*



*Dr. Fok Wai Chung, Raymond*  
BDS (HKU)

## A COMPREHENSIVE LEARNING EXPERIENCE

Throughout the program, we attended informative lectures, pre-surgery briefings, and implant surgeries, during which every participant had the opportunity to observe and assist in the operation theatre. Dr. Fibishenko demonstrated his proficiency in full-mouth rehabilitation cases, treatment planning, surgical skills, digital workflow, and prosthesis fitting. The course also provided us with the invaluable opportunity to consult with the team, visit the in-house dental lab, and observe the fitting of prostheses to patients' mouths.

## EXPLORING AUSTRALIA'S BEAUTY

In addition to the stimulating surgeries and educational sessions, the Peak Dental team treated us to a delightful array of Australian seafood, steak, and dairy products, and provided us with a warm hospitality and exceptional service. Our free time was spent exploring Melbourne's noteworthy landmarks, such as the casino, Graffiti Lane, shopping malls, and wine yards.

Following the course, I embarked on a journey to Sydney, Hobart in Tasmania, and Melbourne, where I experienced the unique charm of each city, from the vibrant cosmopolitan feel of Sydney to the historical richness of Hobart and the cultural diversity of Melbourne. I was particularly captivated by the natural beauty of the Blue Mountains and the colorful bathing boxes of Brighton Beach.

The All-on-4 Implant Clinical Residency Program and my travels throughout Australia provided me with an enriching learning experience, fresh perspectives, and unforgettable memories. I am deeply grateful for the opportunity and look forward to putting my newfound knowledge into my dental practice.

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# What is coming up for ITI members?



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For more information checkout (ITI member exclusive) →



## HOT OFF THE PRESS

### Forum Implantologicum

In March 2023, the ITI held its first ever Consensus Workshop on Zygomatic Implants to evaluate the current literature towards reaching a consensus and providing evidence-based recommendations for the safe use of zygomatic implants. In four video interviews, the leaders and first authors of the three working groups provide insights into the discussion and findings of this milestone meeting.

For more information checkout (ITI member exclusive) →



## DID YOU KNOW?

We are introducing another amazing event for 2024: the ITI Safari. Combine an adventure in the wild with an educational experience that pushes your skills in managing complex cases. Book now to save your place and join Pro Stephen Chen and Pro Matteo Chiapasco on the ITI Safari in South Africa from August 24-29, 2024.

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# Coffee

## A JOURNEY THROUGH THE RICH TAPESTRY OF CULTURE

### Coffee

is not merely a beverage; it is an embodiment of a vibrant and captivating culture. It serves as a conduit for people to forge connections, take respite from their bustling lives, and indulge in moments of tranquillity. Whether nestled in a cozy café or amidst the dynamic ambiance of a bustling coffee shop, the coffee culture has seamlessly integrated itself into the fabric of countless individuals' daily rituals. In this captivating article, we embark on an exploration of the captivating evolution of coffee culture and its profound impact on modern society.



#### Tracing the Historical Footprints of Coffee Culture

Coffee has long been an intrinsic part of human civilization, its roots stretching back through centuries of cultural significance. Believed to have originated in Ethiopia, coffee initially took the form of a tea-like elixir. Over time, its allure spread to various corners of the globe, captivating the Middle East, Europe, and eventually, the Americas.

In the Middle East, coffeehouses emerged as sanctuaries of social and cultural exchange. These vibrant establishments, fondly referred to as "schools of the wise," became vibrant hubs of intellectual discourse and spirited debates.

Across Europe, coffeehouses also found favor as cherished gathering spots, particularly in prominent cities like London and Paris. Frequented by luminaries from the realms of art, literature, and academia, they served as catalysts for the Enlightenment, sparking intellectual revolutions.

In the Americas, coffee culture flourished during the 18th century, particularly in bustling metropolises such as New York and Boston. Coffeehouses emerged as vibrant meeting grounds, fostering the exchange of news, ideas, and ideals, and becoming intertwined with the spirit of the American Revolution.



#### The Resounding Impact of Coffee Culture

Coffee culture reverberates with an indelible impact on modern society, permeating various spheres of human existence and forging new social and cultural practices. A striking consequence of coffee culture is the surge in remote work. Coffee shops have seamlessly transformed into idyllic workspaces, attracting freelancers and remote workers seeking an environment that fosters productivity and human connection. Moreover, coffee culture has sparked awareness of its environmental footprint. The proliferation of single-use coffee cups has prompted growing concerns about the ecological ramifications of coffee consumption. In response, many coffee shops have embraced sustainable practices, offered reusable cups, and pioneered eco-conscious initiatives. Economically, coffee culture fuels a multi-billion-dollar industry, providing livelihoods for millions worldwide. Additionally, coffee shops have evolved into sought-after destinations for tourists, bolstering the growth of the tourism sector.

Finally, coffee culture has implications for our well-being. While coffee consumption has been associated with a plethora of health benefits, excessive intake can lead to adverse effects such as anxiety and insomnia. It is essential to Savor coffee in moderation, remaining mindful of its potential consequences. We delve deeper into these intriguing aspects in the upcoming issue of Dental Diaries.



#### The Blossoming of Coffee Culture

Today, coffee culture has blossomed into a thriving industry, its economic influence reaching staggering proportions. Coffee shops grace nearly every street corner, and the consumption of this beloved elixir has seamlessly woven itself into the tapestry of daily life for countless individuals.

At the forefront of this cultural transformation stands the emergence of specialty coffee. Crafted from meticulously sourced, roasted, and brewed beans of exceptional quality, specialty coffee has become the realm where coffee enthusiasts can embark on an enchanting exploration of intricate flavors and nuanced profiles. This, in turn, has given rise to a new breed of coffee shops, specializing in the artistry of this beloved brew.

Alongside the advent of specialty coffee, coffee culture has been profoundly shaped by the ascent of renowned coffee chains like Starbucks. These ubiquitous establishments have democratized coffee consumption, making it accessible to the masses, and have played a pivotal role in popularizing coffee as a lifestyle choice.

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# Durable, Contemporary Cementation of Lithium-Disilicate Crowns and Veneers

Jack D. Griffin, Jr., DMD

**Abstract:** Clinicians have many restorative options from which to choose. For indirect restorations, the selection of cementation technique is critical to a successful outcome. One emerging trend in dentistry today is the development of materials that have bio-interactive or regenerative qualities. This case presentation reports on the use of a calcium silicate-based dual-cure resin cement that has shown to be effective for use with full-coverage lithium-disilicate restorations due to not only its excellent clinical characteristics but also calcium and fluoride release capabilities. The case also includes conservative lithium-disilicate veneer restorations.



Many viable material choices are available in restorative dentistry today. Despite the ever-growing arsenal of newer materials and techniques, clinicians are often reluctant to change from using those materials and methods with which they are most familiar and have had success. Above all else, clinicians want predictable, repeatable results.

Restorative dental materials have advanced to meet the increasingly bio-friendly and metal-free esthetic demands of the public today. Contemporary materials are expected to have, not a negative, but a positive effect on living tissues. An aversion to metal, the avoidance of potential allergies, and the systemic effect of dental materials all drive the dental profession to be more biologically tolerant.

## Versatile predictability

When working with indirect restorative materials, clinicians require consistency in esthetics, functionality, durability, and patient comfort. Zirconia and lithium disilicate have become dominant materials in modern metal-free dentistry.<sup>1</sup> They are commonly used for restorations ranging from conservatively prepared veneers to full-coverage crowns to full-arch prostheses.<sup>2</sup> Factors such as occlusion, parafunctional habits, esthetics, and biological effects influence a clinician's choice of indirect materials.<sup>3,4</sup>

The success of lithium disilicate, specifically IPS e.max® (Ivoclar Vivadent, [ivoclarvivadent.com](http://ivoclarvivadent.com)), has been well documented, and it has become one of the most versatile esthetic materials in dentistry.<sup>5</sup> The dental profession has had more than 15 years of clinical performance and numerous studies to fairly evaluate this material, its clinical properties, and durability.<sup>6,7</sup> Success has been observed in both full-coverage and conservative restorations as well as in anterior and posterior situations.<sup>8</sup> High translucency imparts vitality to a restoration and is important to its esthetic success.<sup>9</sup> The esthetic predictability of lithium disilicate, particularly when used in conservative anterior preparations, makes it a popular cosmetic material choice. Lithium disilicate is available in several different levels of opacities. The opacity should be chosen on a case-by-case basis depending on preparation shade, thickness of the restoration, and desired final shade.<sup>10</sup>

## Modern cementation

Cementation technique is critical to restoration success,<sup>8</sup> and clinicians have many materials and methods from which to choose: cement or bond, light cure or chemical cure, acid-etch or no etch, bonding agent or self-adhesive, silane or sandblasting, etc. Retention is but one of many factors influencing cement choice. Other factors include long-term physical properties, color predictability, ease of clean-up, and the luting material's compatibility with the restoration material.<sup>11</sup> Self-adhesive resin cements work well with retentive preparations, but light-cure resin cements with separate steps for phosphoric acid-etching and adhesion provide better long-term results with preparations that have less-than-ideal retention.<sup>12,13</sup>

Light-cure-only resin cements are often used with conservative anterior restorations because of their longer working time, predictable clean-up, excellent esthetics and color stability, and high strength.<sup>14</sup> Transparent light-cure resins have been demonstrated to yield superior color stability when compared to luting materials with more color or that are dual cure.<sup>15</sup>

Full-coverage restorations allow for greater diversity in cementation choices. Self-adhesive dual-cure resin cements are popular with full-coverage restorations because of their simplicity and predictable results. They provide a moderate bond to dentin and good esthetics.

A newer emphasis has been placed on cements that are bio-interactive or regenerative in nature.<sup>16</sup> Bioavailable ions generate an alkaline pH environment, neutralize acid, and ultimately promote healing, which may result in a less sensitive, longer-lasting restoration. The cement responds to the oral environment to provide therapeutic ions.<sup>17</sup> Calcium silicate-based dual-cure resin cements have shown to be an effective choice for full-coverage lithium disilicate because of excellent clinical characteristics along with calcium and fluoride release.<sup>18</sup>

The following case report demonstrates the use of an ion-releasing self-etch, self-adhesive calcium-silicate resin cement with layered lithium-disilicate crowns and a translucent light-cure resin cement for placement of lithiumdisilicate veneers.

### Crown and Veneer case

A 61-year-old patient presented with her tooth No. 9 crown loose, and she could actually remove it (Figure 1). Many years earlier the patient had had endodontic surgery, an apicoectomy and retrograde filling to repair a failing silverpoint obturation, and was now symptom free. The silver point remained in the tooth and showed no lesions on radiograph. Tooth No. 8 had an unbonded porcelain veneer that had come off “several times” before. She wanted to replace the restorations on the central incisors with ones that would be a “lighter color” and to bleach her other teeth (Figure 2).

A full series of photographs was taken and reviewed with the patient. Occasionally, in the author’s experience, patients might want to choose a “lighter color” for their restorations and attempt to bleach their other teeth until they match. After some discussion and patient education, the patient accepted a plan calling for lithium-disilicate porcelain restorations on teeth Nos. 5 through 12, which included full coverage on the central incisors and conservative veneer preparations on the other teeth. A full-coverage restoration for tooth No. 8 was chosen because the existing preparation was primarily in dentin, there was a history of veneer failure, and doing so would provide the laboratory with symmetrical consistency in restoration thickness.

Another full series of photographs was taken, a mock-up was done, and a temporary impression matrix was made. The patient chose a final VITA 3D shade of .5M1 (VITA, vitanorthamerica.com). Preparations were done using a course diamond (NeoDiamond®, Microcopy, microcopydental.com), with 1.5 mm occlusal clearance and chamfer margins. On teeth Nos. 5 through 7 and 10 through 12, 0.5 mm veneer preparations were executed with a finishing diamond, staying in enamel in all places except abfraction areas at the gingival margins. Preparation corners were rounded to reduce internal stresses on the restorations.

Shade photographs were taken on moist teeth with shade tabs on the same plane as the teeth (Figure 3). Because of the dark gray color of the endodontically treated tooth No. 9, the silver point was removed from the coronal portion of the tooth and replaced with a dual-cure build-up material (CoreFlo™ DC, BISCO, bisco.com), shade Natural/A1 (Figure 4). Communicating the final preparation shades accurately to the laboratory was critical in enabling the lab to choose the most translucent shade of lithium disilicate that would mask the preparation and achieve the final color desired.

Conventional impressions were taken with a polyvinyl siloxane material (Panasil®, Kettenbach, kettenbach-dental.us) in a stock tray and sent to the laboratory with all photographs, the bite registration, and a dentofacial analyzer index (Kois Dentofacial Analyzer, Panodent, panodent.com). Temporary restorations were made for the central incisors, 2% chlorhexidine (Cavity Cleanser™, BISCO) was painted on the teeth, and the restorations were placed with a temporary cement (ZONEfree™, Pentron, pentron.com). The veneer preparations were temporized via spot-etching and lock-on technique without the use of a bonding agent.

All records were sent to the laboratory and all case photographs were uploaded to the lab portal. After 5 days, the patient returned for evaluation of color, length, and function with the temporaries. Slight adjustments were made, polishing was done, photographs were taken, and desired changes were communicated with the lab.



Fig 1. Patient with failed veneer No. 8 and dislodged crown No. 9. Fig 2. Treatment goals were to replace restorations on the central incisors and lighten color throughout the dentition. Fig 3. After restoration removal and veneer preparation, shade photographs were taken. Fig 4. Silver point was removed from coronal portion of tooth No. 9, and build-up was done with dual-cure material resulting in less darkness on the tooth.

### Cementation for Crowns

The layered lithium-disilicate restorations were returned from the laboratory having been hydrofluoric acid-etched and silanated. With a frosty appearance the intaglio surfaces were ready for cementation. The temporaries were removed, the teeth were cleaned with flour pumice, and the restorations were inspected in place. No adjustments were needed in this case.

All restorations were rinsed, cleaned with a restoration cleaner (ZirClean™, BISCO) to remove contaminants, rinsed again, and re-silanated (Bis-Silane™, BISCO). The two crowns were cemented with a self-etch, self-adhesive calcium-silicate resin cement (TheraCem, BISCO) and held in place for about 1 minute; excess cement was easily removed (Figure 5). After complete clean-up light-curing was done at the margins. In the author’s experience, the calcium and fluoride release, easy clean-up, and physical properties make this cement an excellent choice for routine lithium-disilicate full-coverage placement.

This self-etch, self-adhesive cement is available in a “natural” shade and provides firm bond to dentin and most modern dental materials such as etched lithium disilicate and zirconia. The high calcium content in this calcium and fluoride ion-releasing cement gives the material a slightly opaque, white appearance but does not seem to influence the final restoration shade in routine indirect restorations.



Fig 5. Central incisors were cemented with a calcium-silicate dual-cure resin cement. Fig 6. Teeth with veneers were totally etched for 20 seconds and rinsed.



### Cementation for Veneers

The intaglio surfaces of the veneers after re-silantation were thoroughly dried, and a universal dentin bonding agent (All-Bond Universal®, BISCO) was applied and airthinned. The teeth were isolated with retractors, etched with 37% phosphoric acid (Etch-37™ with BAC, BISCO) for 15 seconds, and rinsed (Figure 6). The universal adhesive was applied in several applications, allowed to sit for 20 seconds, air-dried with an air syringe for 10 seconds, and then light-cured for 10 seconds (Figure 7).

After material was extruded from the tip onto a napkin, the translucent light-cure resin cement (Choice™ 2, BISCO) was applied to each tooth, and the veneers were placed ensuring that excess material extruded from all margins (Figure 8). The excess material was brushed away and all restorations were flossed while being held securely in place. Along with long-term color stability, the light-cure-only material allowed for thorough clean-up and an efficient cementation process.



Fig 7.



Fig 8.



Fig 9.



Fig 10.

Fig 7. Several coats of universal bonding agent were applied, air-dried, and light-cured. Fig 8. Light-cure-only cement was applied to the teeth, veneers were placed, clean-up was completed, and light-curing was done. Fig 9. Soft-tissue response was excellent, as was long-term prognosis. Fig 10. Good opacity of the selected lithium disilicate resulted in a consistent final shade.

With each veneer being held in place, the restorations were cured with an LED light. Minor adjustments were made with a finish diamond, and the restorations were polished.

The patient was scheduled for a follow-up appointment for adjustments as needed, cement clean-up, final photographs, and to place direct composite on the facial surfaces of the second bicusps for enhanced blending. The soft-tissue response at 6 months was excellent for both the full-coverage restorations and the veneers (Figure 9). The blending of materials, despite varied restoration thicknesses, was acceptable, and the patient enthusiastically approved of the final color shade (Figure 10).

### Conclusion

As materials for indirect restorations continue to advance, biologically friendly cements can help generate a less sensitive, longer-lasting restoration through calcium and fluoride release. As demonstrated in this case report, a calcium silicate-based dual-cure resin cement, offering excellent clinical characteristics, including easy clean-up, was an effective choice for full-coverage lithium-disilicate anterior restorations.

## Medit Revolutionizes Customer Experience with Direct Online Shopping Mall

Medit, a renowned provider of cutting-edge 3D intraoral scanners and digital dentistry solutions, has recently unveiled its online shopping mall (shop.medit.com), enabling customers to conveniently purchase the company's products and services.

One of the notable offerings available through the online shop is scanner warranties. Previously, customers had to depend on local dealers to obtain scanner warranties, which often involved lengthy processing times of several weeks. However, with the introduction of the new online shopping mall, customers can now effortlessly purchase scanner warranties with just a few clicks, and orders are processed within two days. Upon entering a scanner's serial number, the shopping mall's automated system calculates and presents the customer with various warranty extension options. Users have the flexibility to acquire additional warranty coverage for up to four years in a single transaction.

The online shopping platform presently offers a curated selection of items, with plans to expand its product range to include a diverse array of offerings in the near future. Customers can anticipate a broader range of products that will enhance their digital dentistry experience.

"We are excited to introduce our new online shopping mall, providing our customers with a streamlined purchasing experience," said GB Ko, CEO of the company. "By offering scanner warranties directly through our platform, we aim to simplify the process and significantly reduce waiting times."



# Dental Industry News

## HKU Oral and Maxillofacial Study Shows Improved Quality of Life in Long Jaw Patients with Internal Fixation Surgery

Mandibular prognathism, a condition characterized by an overdeveloped lower jaw, can negatively impact an individual's chewing function, facial aesthetics, self-esteem, and cause jaw joint pain. In Hong Kong and Southern China, this facial deformity is more common compared to Western countries. Orthognathic surgery, involving the repositioning of the jawbone, is necessary for correcting mandibular prognathism. Two commonly used surgical techniques are intraoral vertical ramus osteotomy (IVRO) and sagittal split ramus osteotomy (SSRO).

A recent study led by Dr. Mike YY Leung from the University of Hong Kong compared the quality of life (QoL) changes in patients who underwent IVRO or SSRO for mandibular prognathism. The study assessed the patients' QoL using self-administered questionnaires, including the 14-item Short-Form Oral Health Impact Profile (OHIP-14) and 36-item Short-Form Health Survey (SF-36). The results were analyzed up to two years after the surgery.

The study revealed that both IVRO and SSRO significantly improved oral health-related quality of life starting from three months post-surgery. Younger patients experienced better oral health-related QoL during the postoperative period. In terms of physical and mental health-related QoL, the burden of physical impact was greater than psychological impact in the early postoperative period for both groups. Patients in the IVRO group experienced specific challenges in social functioning, emotions, and mental health, suggesting continuous mental health impact during the intermaxillary fixation period. However, physical, and mental health-related QoL in both groups returned to baseline or improved even further after two years.

Dr. Leung emphasized that the correction of mandibular prognathism through orthognathic surgery improves patients' quality of life, with SSRO offering earlier improvements due to better function. Co-investigator Ms. Natalie Wong highlighted the importance of understanding how different surgical procedures impact patients' quality of life from their perspective, in addition to considering clinical outcomes and risks.

The findings of this study, titled "Comparison of the quality-of-life changes of patients receiving sagittal split ramus osteotomy or intraoral vertical subsigmoid osteotomy for mandibular prognathism," were published in Clinical Oral Investigations.



## Groundbreaking Tooth Regrowth Medicine Advances to Clinical Trials in Japan

A revolutionary medication that enables the regrowth of teeth is poised to enter clinical trials in July of next year, following its development in Japan. The research team behind the innovation plans to make the tooth regrowth medicine available for general use by 2030, with the potential to redefine the field of dentistry.

A Japanese research team is making significant strides in the development of an unprecedented medication that could revolutionize dentistry by allowing individuals to grow new teeth. Clinical trials for the tooth regrowth medicine are scheduled to commence in July 2024.

The medication is specifically designed for individuals who have an incomplete set of adult teeth due to congenital factors. The research team aims to make the tooth regrowth medicine widely accessible.

In previous animal experiments, the medicine successfully stimulated the growth of "third generation" teeth, surpassing both baby teeth and permanent adult teeth. Dr. Katsu Takahashi, the lead researcher and head of the dentistry and oral surgery department at the Medical Research Institute Kitano Hospital in Osaka, expressed his enthusiasm for the concept of growing new teeth. He has been dedicated to this pursuit since his days as a graduate student and remained confident in its realization.

Anodontia, a congenital condition characterized by the incomplete development of teeth, affects approximately 1% of the population. Genetic factors are believed to be the primary cause of oligodontia, a condition in which individuals are missing six or more teeth. Tooth agenesis, as these conditions are also known, can severely impact basic functions like chewing, swallowing, and speaking from a young age, impeding overall development.

Dr. Takahashi pursued molecular biology studies after completing his dentistry degree. During that period, global research efforts focused on identifying genes that, when altered, resulted in genetically modified mice growing fewer teeth. Dr. Takahashi realized that targeting these specific genes could potentially alter the number of teeth humans possess. While it has long been believed that humans only grow two sets of teeth in their lifetime, evidence suggests the presence of "buds" for a potential third set.

Approximately 1% of the population exhibits hypodontia, a congenital condition characterized by an excessive number of teeth. Dr. Takahashi's team's research indicates that one in three such cases manifests as the growth of a third set of teeth. Dr. Takahashi believes that humans may have lost their ability to grow a third set over time.

In the experiment involving ferrets, the application of the tooth regrowth medicine resulted in the growth of an additional seventh front tooth. The new teeth emerged between the existing front teeth and exhibited the same shape, indicating that the medicine induced the generation of third-set teeth in the animals.

Currently, when teeth become irreparable due to severe cavities or dental socket erosion, individuals must resort to dental appliances such as dentures. The ability to grow third-generation teeth could potentially change this paradigm. Dr. Takahashi envisions a future where tooth-regrowth medicine becomes a viable alternative alongside dentures and implants.



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# DENTAL Community BOARD

The dental community board is intended to help share information between all people in the dental field. Whether you are a dentist, hygienist, dental surgery assistant or employer, we got a section for you. Please visit [www.dental-diaries.com](http://www.dental-diaries.com) to leave your message and we will include it in the next edition of dental diaries.

## THANK YOU

for reading the 7<sup>th</sup> edition of the Dental Diaries. We hope you enjoyed your time with us. Please send us any valuable **advice, feedback or enquiries** via the following contact:  
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