Sleep deprivation affects facial appearance

by Dental Tribune International

STOCKHOLM, Sweden: Researchers at the Karolinska Institute in Stockholm have found that sleep deprivation affects features relating to the mouth, eyes and skin. They also suggested that these features function as cues of sleep loss to other people and may thus have significant social consequences.

In order to investigate the facial cues by which individuals recognise that someone is sleep deprived, the researchers photographed the faces of five men and five women after eight hours of normal sleep and after 31 hours of sleep deprivation. Afterwards, 20 male and 20 female participants with an average age of 25 rated the photographs with respect to fatigue, facial cues and sadness.

Overall, the faces of sleep-deprived individuals were perceived as having more wrinkles or fine lines and droopier corners of the mouth, the researchers reported. The participants also stated that those who had slept less had droopier eyelids, redder eyes, eyes that were more swollen, darker circles under the eyes and paler skin. In addition, sleep-deprived individuals appeared sadder than after normal sleep, and this apparent sadness was related to looking fatigued.

"Since facial regions, such as the eyes and mouth in particular, contain a lot of information on which humans base their interactions with each other, how fatigued a person appears may affect how others behave toward him or her," said Tina Sundelin, lead author and a doctoral student at Stockholm University's Department of Psychology.

The study, titled "Cues of fatigue: Effects of sleep deprivation on facial appearance", was published in the September issue of the SLEEP journal.

Coconut oil could reduce dental caries

ATHLONE, Ireland: Researchers think that coconut oil may be of great interest to the oral health industry in the future because a new study has found that its natural antibiotic properties strongly inhibit the growth of bacteria that cause oral infections. The researchers suggest that the oil could be integrated into commercial dental consumer products to combat tooth decay.

In particular, the researchers discovered that coconut oil that had been treated with enzymes similar to those found in the digestive tract was most effective in blocking the development of most strains of Streptococcus bacteria, including Streptococcus mutans, which is a major cause of tooth decay.

Additional tests revealed that the same enzyme-modified variant of coconut oil was also harmful to Candida albicans, the yeast that causes oral thrush, among others.

“Dental caries is a commonly overlooked health problem affecting 60 to 90 per cent of children and the majority of adults in industrialised countries,” said Dr Damien Brady, who lectures in Microbiology, Environmental Science and Veterinary Medicine. “Incorporating enzyme-modified coconut oil into dental hygiene products would be an attractive alternative to chemical additives, particularly as it works at relatively low concentrations,” he added.

The research was carried out at the Athlone Institute of Technology’s Bioscience Research Institute.

The findings were presented on 3 September at the Society for General Microbiology’s autumn conference at the University of Warwick.
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Interview: The patient should be told the truth

What other factors besides smoking, drinking and HPV are currently being investigated, and what is their malignant potential?

People chew betel nut preparations (e.g. paan masal and gutka) in parts of India, Pakistan, Bangladesh and surrounding areas. These cause initial fibrosis of the oral tissue, termed ‘submucous fibrosis’, which carries a high risk of causing oral cancer of possibly 30 per cent. Submucous fibrosis can arise even in young individuals and is irreversible, and thus patients are likely to have a lifelong risk of mouth cancer, even if they stop the causative habit. The nightmare scenario is that when examining a patient with submucous fibrosis the mouth opening can be so small that a clinician may be unable to see the cancer.

Mouth cancer can also arise in patients who have rare genetic disorders, such as Fanconi anaemia and dyskeratosis congenita, but the most common oral cancer that is caused by the local risk factor is oral lichen planus. This is a global disorder that typically occurs in middle-aged and older women. It is a chronic immune disorder that may cause painless white patches that sometimes are accompanied by painful erosions or ulcers. It affects about 1 to 2 per cent of the population and is the most common disorder to affect the lining of the mouth (the oral mucosa).

It has been suggested that 1 to 2 per cent of patients with oral lichen planus will develop mouth cancer, but this risk is highly unpredictable because it does not appear to be consistently associated with the duration or type of treatment of the lichen planus, nor the age or sex of the patients, nor their alcohol or tobacco habits. The good news, perhaps, is that 98 to 99 per cent of patients with oral lichen planus will not contract mouth cancer.

Isolated white or red patches on the oral mucosa (sometimes termed ‘leukoplakia’ and ‘erythroplakia’) have malignant potential as well, but these are actually uncommon, particularly the latter, compared with oral lichen planus.

Besides new treatment concepts, pre- and post-treatment strategies are the most effective strategy against oral cancer. Why do so many dentists still appear to overlook obvious signs of the disease, and what are the current screening procedures have shortcomings?

The great majority of patients ultimately found to have mouth cancer will have been referred to a specialist service because a dentist or other dental professional will have noticed something abnormal. He or she might not have known what it was, but they did the correct thing by referring the patient to a specialist.

Screening for possible mouth cancer is straightforward. It is just a matter of examining the neck and mouth carefully. However sometimes dentists do not know what to look for, as they have probably never seen more than one type of oral cancer in their professional lives.

Similarly, mouth cancer is more likely in socio-economically deprived groups than the wealthy. Socially disadvantaged people have a tendency not to attend health care providers, including dentists, on a regular basis nor to take up possible screening opportunities for common diseases and therefore have a variable awareness and practice of disease prevention strategies, whether concerning oral health or general health.

Clear, the best option for screening would be opportunistic screening, where health care staff examine patients in risk groups for a particular disease, but this requires people to want to attend a clinic and to appreciate the possible benefits of such attendance for their health and well-being.

Is there any evidence that regular screenings could help prevent oral cancer?

There is no evidence that a particular frequency of dental examination will lessen the risk of mouth cancer. However, the more regularly a person is examined, the greater the chance that emerging malignant or potentially malignant disease will be detected and that any lesion present will be small.

However, overzealous review is likely to be wasteful and thus all patients should be advised that if they become aware of a change in their gingivae or oral mucosa that persists for more than three weeks and has no obvious local cause, or example a sharp tooth or filling, they should seek advice from their dentist.

In its 2008 policy statement, the FDI stresses the important role of dental professionals in the detection of oral cancer and patient education. To what extent are dental professionals fulfilling this role?

The majority of patients ultimately found to have oral cancer will have been identified by a dentist or other dental professional, thus dental professionals are fulfilling this role to a great extent. However, dental professionals should also be able to give advice about oral cancer prevention, for example tobacco and alcohol cessation, and information on where additional advice can be obtained for example tobacco cessation services.

The current rule of thumb is that the more people smoke and the longer that habit the greater the risk.

Daniel Zimmermann, DTI

Detecting and managing potentially malignant diseases of the mouth still pose challenges to dental professionals worldwide. In Istanbul, the Dental Tribune ONLINE had the opportunity to speak with FDI president Prof. Stephan Porter from the UCL Eastman Dental Institute in London about new risk factors, prevention strategies and why actor Michael Douglas is not a good poster boy for changing awareness of throat and mouth cancer.

Dental Tribune ONLINE: A recent study on Turkish dental patients in central Anatolia has shown that only one in two people are aware of oral cancer. Are these results representative of most people’s knowledge about the condition nowadays?

Prof. Stephan Porter: It is not uncommon for individuals not to be aware that cancer can arise in the mouth. Indeed, there are studies indicating that even patients without cancer who attend clinics that specialise in mouth cancer are unaware of the possibility. This trend regarding a lack of awareness occurs across the globe, although it varies between countries.

With celebrities like actor Michael Douglas struggling publicly with the disease, do you think awareness of malignant diseases of the mouth is increasing?

Undoubtedly, it will increase. When a celebrity announces that he or she has a particular disorder, there is often an upsurge of referrals by concerned individuals. In the UK, this was perhaps best illustrated when Freddie Mercury declared that he had HIV. There was a substantial rise in the number of persons seeking advice and/or testing for the disease in the aftermath.

A fair number of famous people have had oral cancer, including Sigmund Freud, Ulysses S. Grant and TV producer Aaron Spelling to name but a few. In the UK, journalist and first husband of TV cook Nigella Lawson John Diamond wrote a series of articles detailing the progress of his disease and its treatment that informed many of the impact this disease can have on an individual and his or her family.

Unfortunately, the Michael Douglas situation has perhaps confused the exact role of the human papillomavirus (HPV) in mouth cancer. Certainly, it can cause mouth cancer and it can be acquired through orogenital contact, but there is no evidence that such contact will lessen any subsequent risk of contracting mouth cancer.

Oral cancer figures are rising worldwide. What are the reasons for this, and does it fulfil the criteria for an epidemic, as it has been called in some media reports?

An epidemic is defined as new cases of a disease in a given human population over a particular period. It often has an emotive element to it. Oral cancer certainly is on the increase in the developed world, although the number of new cases is falling in some parts of the globe, notably parts of India.

The rise in some countries is gradual but sustained. Smoking tobacco and/or drinking alcohol are the two factors that traditionally have given rise to mouth cancer. In addition, individuals are now acquiring cancer-causing (oncogenic) types of HPV, probably via orogenital contact. This burst of infectious disease, or indeed sexually transmitted infection, is not a new phenomenon, but it has become much more manifest in the last 30 years. So, what is new is probably that oncogenic types of HPV are just more common in the sexually active population than in the past.

The exact rate that it carries is unclear but it has been suggested that the risk of HPV-related mouth and/or throat cancer when smokers have had more than nine different sexual partners.

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Published by Jaypee Brothers Medical Publishers (P) Ltd., India
Dental Tribune India
www.dental-tribune.com

Dental Tribune Indian Edition - September 2013
Impression and registration for full-arch implant dentures

**Author:** Prof. Gregory-George Zafiropoulos, Germany

**Introduction**

Usually, a full denture is delivered following tooth extraction or implant insertion of a fully edentulous arch. A denture is usually used until the final restoration is performed. A well-designed full denture should fulfill the following criteria: 1) correct vertical height and maxilla-mandibular relationship; 2) accurate occlusion; 3) appropriate choice of teeth with regard to shape, length, width and position; 4) adequate lip support, and 5) proper function and aesthetics to meet the patient’s expectations. The final restoration should fulfill or surpass these requirements. Obtaining a correct impression and accurately evaluating the interocclusal relationship (e.g., interocclusal distance, occlusal recording and determination of the exact position of the placed implants) are often challenging and time-consuming tasks.

The aim of the current report is to present an impression and registration technique that allows the transfer of the interocclusal relationship, occlusal recording and esthetics that were initially applied to produce a full denture as a template for the reconstruction of the final full-arch implant.

**Materials and Methods**

Following multiple extraction of a non-salvageable rest dentition and the placement of six dental implants in positions #4, #5, #6, #11, #12, #13, a full denture was fabricated. After the extraction sites had healed and denture sites were eliminated, the function and esthetics of the denture was optimized. If necessary, angulations, shape and color of the denture teeth and the shape of the denture base were corrected (Fig. 1a).

The resulting denture was used by the patient until the final restoration was delivered. For the final restoration of the maxilla, an implant-retained denture with telescopic crowns as attachments was planned.

After the implant was uncovered, the denture was modified to allow sufficient space for the healing abutments. A duplicate of the denture (DentDu) was made out of clear resin (Paladur, Heraeus, Hanau, Germany, Fig. 1b). A trial of the DentDu was performed and minor occlusal discrepancies were corrected (Fig. 1c). Bite records were taken in centric occlusion with modeling resin (pattern resin®, GC, Alsip, IL; Fig. 1c), using the casts of the original denture. Afterwards, the DentDu was placed in an articulator and a controlling of the occlusion was made (Fig. 2a) with the bite records. A pickup transfer system consisting of a titanium impression post and a plastic impression sleeve was employed (Dentegris, Duisburg, Germany, Fig. 1b). A trial of the DentDu was carefully modified by creating internal clearance in the area of the implants so that it could be applied as an individualized custom tray. This permitted it to be fully seated when the impression posts were in place. Impressions were generated by a polymer material (Impregum, 3M ESPE, St. Paul, MN). During this process, the DentDu was kept in centric occlusion using the bite records (Fig. 3a).

The titanium impression posts were connected with the implant analogues and with the plastic impression sleeves (Dentegris), which were embedded in the impression material (Fig. 3b). A master cast was then fabricated and articulated with the help of the bite records (Fig. 3c, Figs. 4a & 4b).

Customizable abutments (Dentegris) were taken to fabricate the implant abutments. Parallelism, angulation, position and shape of the implant abutments were determined using a silicon key fabricated from a tooth extraction or implant insertion of a fully edentulous arch. A denture is usually used until the final restoration is performed. A well-designed full denture should fulfill the following criteria: 1) correct vertical height and maxilla-mandibular relationship; 2) accurate occlusion; 3) appropriate choice of teeth with regard to shape, length, width and position; 4) adequate lip support, and 5) proper function and aesthetics to meet the patient’s expectations. The final restoration should fulfill or surpass these requirements. Obtaining a correct impression and accurately evaluating the interocclusal relationship (e.g., interocclusal distance, occlusal recording and determination of the exact position of the placed implants) are often challenging and time-consuming tasks.

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Porcelain is a possible material for veneering of fixed-denture frameworks. If the angulation of the implants does not allow for taking impressions in the above-described way and an open-tray impression is preferable, finestrations can be fabricated into the DentDu (Fig. 14).

Discussion

The reconstruction of the fully edentulous arch with implant-retained dentures necessitates thorough planning and a precise and passive fit of the superstructure. A previous study demonstrated that a passive fit between the implant superstructure and the underlying abutments is essential for the long-term success of the implant prosthesis. To achieve a passive fit, an accurate positioning of the implant replicas in the master cast must be assured. The impression technique and the splitting of the implant copings are factors which may contribute to errors in the final positioning of the implant analogs, thus leading to inaccuracies in the fit of the final superstructure. Furthermore, the angulation or proximity of the implants may inhibit proper seating of the impression copings and/or caps, which may also have a detrimental effect on the registration of the implant position.

The precise recording of the maxillo-mandibular, e.g. interocclusal distance, interproximal distance, interocclusal relationship, tooth shape and color and angulations during the entire healing period. In this way, the patient was able to acclimatize to the function and esthetics of the denture. In the method described in this report, an accurate impression and recording of the full denture was achieved by using a duplicate as a custom tray for the impression. Therefore, it was not necessary to repeat all the steps usually needed for recording the interocclusal relationship, e.g. wax-up, etc., at the time of the fabrication of the final restoration.

If an open-tray impression is preferred, only minor changes to the procedure are necessary. This method is based on a previous publication. In cases such as this, it is advisable to fabricate two DentDus. The impression can be taken by the first DentDu, the second DentDu is used for the remaining steps. Customized abutments to the final abutments are applied instead of a bar, galvano copings allow a precise transfer coping, and secondary telescopes as well as different technologies are employed for the transfer of implant positions and for the construction of the superstructure.

Customized implant abutments allows for better angulations and shape, for improved occlusal force transmission from the crown to the implant and the bone, and also for facilitating the fabrication of an esthetically pleasing implant-supported denture. Ways in which abutment design contributes to improved esthetics include changes in the location of the crown and changes in the dimension and form of the restorative platform.

Additionally, features of the abutment design contribute to the health and dimensional stability of the soft tissue. Current attempts to objectively define implant-restoration esthetics have focused on periodontal mucosal parameters. The introduction of the UCLAbutment provided a custom solution for implant restorations. This direct-implant restoration concept provided adaptability. Through waxing and casting, the diameter, height, and angulations may be addressed in order to provide a wide range of clinical solutions for problems associated with limited interocclusal distance, interproximal distance, implant angulations and related soft tissue responses.

The customized implant abutments served as primary telescopes, and the electroformed copings were used as secondary telescopes in cases where a removable denture with telescopic crowns was used as the attachment. Electroformed gold copings are associated with several advantages, in conjunction with both removable and fixed restorations. The galvano-forming and electroforming process yielded a precisely-fitted secondary coping for the implant abutment with a gap of only 12–30 μm. The gold electroformed coping ensures space and is made of high-quality material. Using gold copings for the impression allows for the exact transfer of the form, angulations and position of the inserted customized implant abutments.

With the help of the milled mock-up, the future fit of the CAD/CAM fabricated framework can be evaluated and necessary changes in the shape of the restoration and occlusion can be made. Making these changes on the mock-up was easier and less time consuming than making them on the metal framework itself, and it was then possible to transfer them directly to the final framework. Furthermore, the mock-up almost “splitted” the electroformed gold copings during the impression, allowing for the exact transfer of the abutment position. At the same time, the vertical height and interocclusal relationship were recorded. The delivery of a milled temporary restoration permitted a slow and non-progressive loading of the implants, which then leads to bone remodeling. Ablumens were left in place after mounting. Combined with the fabrication of a new cast, this further decreased the risk of inaccuracies during the transfer process.

Conclusion

The method described here can be used for full-arch restorations with both fixed and removable implant supported dentures. Accurate impressions can be accomplished and occlusion, vertical dimensions, as well as implant positions can be transferred while facilitating the full-arch restoration process. In addition, this technique resulted in a reduction of the required chair time.

Disadvantages of this technique lie in the fact that the quality of laboratory technician’s work meets higher demands than usual, and that the clinician also needs to acquire some additional skills. Further disadvantages of this method include the need for a highly qualified technical lab and higher technical costs relative to those associated with prefabricated titanium implant abutments.

To date, this method has not been applied in conjunction with immediate implant loading. However, dentists and patients have come to expect this level of rehabilitative accuracy, precision, long-term success and aesthetics.

Editorial note: A complete list of references is available from the publisher.
Study established poor oral health as risk factor for oral HPV infection

According to the Centers for Disease Control and Prevention, HPV is the most common sexually transmitted virus in the U.S.

HOUSTON, USA: Although human papillomavirus (HPV) infection has been increasingly associated with a rising number of cancers of the oropharynx worldwide, no study has examined the role of oral health in oral HPV infection to date. Now, researchers from the U.S. have found that people with poor oral health and those with an oral disease are significantly more likely to contract oral HPV infections.

The study involved 3,439 participants aged 30 to 69 for whom data on oral HPV and oral health were available from the nationally representative 2009–2010 National Health and Nutrition Examination Survey. By analyzing the data, researchers at the University of Texas Health Science Center at Houston found that study participants who reported poor oral health had a 56 percent higher prevalence of oral HPV infection. Those with periodontal disease or related dental problems had a 51 percent and a 28 percent higher prevalence, respectively. In addition, the researchers found a link between the number of teeth lost and oral HPV infection.

The findings suggest that poor oral health is an independent risk factor of oral HPV infection, irrespective of smoking and oral sex practices, the scientist said. “Public health interventions may aim to promote oral hygiene and oral health as an additional measure to prevent HPV-related oral cancers,” they concluded. However, further research is needed to provide a better understanding of this relationship.

According to the researchers, oral HPV infection is the cause of 40 to 80 percent of oropharyngeal cancers. Oropharyngeal cancer was a relatively uncommon cancer, traditionally associated with heavy tobacco smoking and heavy alcohol consumption. However, over the past few decades, its occurrence has increased dramatically in many parts of the world, especially in Europe and North America, and in young adults in particular. Previous studies have already suggested that this increase is due to the growing number of HPV infections.

The study, titled “Examining the Association Between Oral Health and Oral HPV Infection,” was published online on Aug. 21 in the Cancer Prevention Research Journal ahead of print.

Researchers identify role of mouth cells in Candida infection

LONDON, UK: Candida albicans is a species of yeast that causes a number of infections in the human body. In addition to causing oral thrush and sore mouth, these micro-organisms can lead to serious illness or death. New research that provides a better understanding of how mucosal surfaces in the mouth respond to C. albicans to prevent tissue damage was presented recently.

The study was conducted by researchers at King’s College London. In laboratory tests, they exposed oral epithelial cells, a mucosal layer of cells that line the mouth, providing a barrier against microbes, to C. albicans in vitro and looked at particular gene expressions 6 and 24 hours after infection.

The phosphoinosintide 3-kinase pathway, a molecular signalling pathway, was activated about 5 minutes after the specimen had come into contact with C. albicans, preventing the fungus from invading. The researchers suggested that the pathway is involved in priming epithelial cells to prevent future damage.

The researchers believe that the pathway may be an attractive target for new therapeutics. By boosting its activity, it may be possible to reduce tissue damage, suggested Dr David Moyes, research associate at the college.

According to the researchers, Candida infections are the third-most commonly acquired blood-borne infections, resulting in an estimated 50,000 deaths annually.

Moyes presented the findings at the Society for General Microbiology’s Autumn Conference, which finishes today at the University of Sussex.

Thailand wins bid for 2015 FDI Annual World Dental Congress

BANGKOK, Thailand/ ISTANBUL, Turkey: For the third time in five years, the Annual World Dental Congress of the FDI World Dental Federation will be held in an Asian country. An agreement between the Geneva-based dentists’ organisation and the Dental Association of Thailand (DTA) to organise the 2015 edition in Bangkok was signed last week at this year’s FDI congress in the Turkish capital of Istanbul, Dental Tribune ONLINE has learned.

It will be the first time that the South-East Asian country will host the prestigious international dental event. According to DTA President-elect Dr Adirek S. Wongsa, who spoke to Dental Tribune on Friday, his organisation has bid to host the congress in Thailand each year since 1999. It will be a unique event that will not only highlight the rapid development of dentistry in Thailand, but also bring all professions in dentistry together, he said. Preparations have already commenced and more information will be released in the upcoming months.

The congress in Bangkok will follow the 2014 edition, which is being organised by the Indian Dental Association and hosted in New Delhi. The FDI’s most recent congresses in Asia were held in Hong Kong and Singapore. The Korean Dental Association won the bid to organise this year’s congress in Seoul in South Korea but the event there was cancelled, and hosted instead by the Turkish Dental Association last week in Istanbul.

The DTA is currently organising its own dental event, the Thailand International Dental Congress, to be held in November this year. According to Wongsa, the event attracts around 3,000 dental professionals each year. Thailand has a workforce of 12,000 dentists.
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Welcome to the “Block Party”

Restorative clinicians have been spoiled in the past regarding materials for direct and indirect restorations. We’ve had the great luxury of seeing an ad in a journal, getting an offer in the mail or online, or attending a CE course about a new product, technique or service, and then immediately or the next day, we could take action. If we saw a new restorative material for fabricating restorations, we would simply write the request on a lab slip for the new material and expect to get it back in a couple weeks.

Think of the poor laboratory technician on the other end, reading perhaps for the first time, the method you want used to fabricate your restoration or a specific new material or a mix of materials and techniques. Remember, a laboratory slip or prescription is a work authorization, and if you write one, the laboratory technician has to comply. If we change our minds for the next restoration, we simply prescribe something else. I’m sure technicians sometimes feel as if they’re chasing their tails with all the new materials, techniques and requests. Consider the investment in materials, systems, training and the learning curve they have to endure every time a new material is prescribed.

To the relief of patients, dentists, team members and technicians comes CAD/CAM dentistry and a little bit of sense and sensibility regarding dental materials. Dental material manufacturers need to invest in the technology, methodology and product design, as well as the material evolution to the restoration (blocks, mandrels, discs), in order to introduce a new material for CAD/CAM dentistry. Then, in collaboration, dental CAD (computer-aided design) and dental CAM (computer-aided manufacturing) developers must work with that material to produce consistent optimized results. This takes time and effort. Only those materials proven through economic evaluation, clinical validity and proven demand will make it to the final stages and into the software of the CAD systems and into the mills of the CAM systems and ultimately into our patients mouths.

CAD/CAM also requires the dentist to take more control of all facets of patient care; it requires more thought than a whim and a handwritten prescription to choose the right material. CAD/CAM requires thinking through the restorative and aesthetic process before proceeding with a restoration, all better things for the dental professional as a whole. As more and more laboratories and dentists invest in digital dentistry, everyone gains.

I’m “all in” for ‘daily digital dentistry’! I have digital impression-
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Interview: ‘Referred patients are the best patients’

Dr. William Cheung (Photo: Cheung)

Dentistry is still largely a profession focused on treatment rather than prevention of oral diseases like caries or periodontal disease. A preventive approach in dentistry is needed more than ever, according to Dr. Pramod Gurav, programme director for the Asia-Pacific region and FDI AWDC presenter Dr. William Cheung.

There is also carries management by risk assessment, where we sit down with the patient and go through a certain process step by step. With the outcome of this, we can identify certain areas that need special attention. Then we formulate a protocol for this particular patient, managing his or her risk, or minimising it. This is not necessary for every single patient but if we expect the patient to be highly susceptible to caries then we would go through that exercise and perform a risk assessment.

Such a model clearly benefits the patient. What is in it for the dentist? Patients sense that you have a preventive approach at your practice and actually notice that you are going through all these exercises for them. This creates a positive image for the practice.

As dentists, we gain greater satisfaction because we can see the result of introducing this type of approach to patients that will subsequently be of benefit to them. By having patients come in regularly, you can identify something and can offer choices rather than expecting patients to come in only once they have a problem. When you start to build this kind of positive image and patients are happy, they are going to refer patients to you. Referred patients are the best patients in my opinion.

Considering all the prevention-focused initiatives that organisations like the FDI are running, where do we stand with the preventive model? Unfortunately, at a congress like the FDI AWDC here in Istanbul, most dentists want primarily to attend presentations in fields like cosmetic dentistry and implants. Those are the major topics that they are interested in, and I do not blame them because implants can generate a lot of revenue. As dental professionals, however, I think we owe it to our patients to adopt a preventive philosophy. If we do the right thing, it can be rewarding as well financially. So, if you ask me when we are going to reverse this trend, I do not have an answer for you but as a dental association it is our responsibility to teach prevention and ensure that dentists understand what that means.

Thank you very much for the interview.

AWDC attendees receive invitation to India

ISTANBUL, Turkey: With Indian Dental Association President Dr. Pramod Gurav addressing friends, long-term partners and guests of the FDI World Dental Federation today at the Istanbul Congress Center during an official lunch, the eyes of the international dental community are slowly turning away from Istanbul to New Delhi, where the next Annual World Dental Congress will be held next year from 11 to 14 September at the India Expo Centre in Greater Noida.

It will be the second congress held by the organisation in the Asian country after the one in 2004. Gurav said that his country has become a land of opportunity for dentistry, with oral health care awareness and access to oral health care constantly increasing. He remarked that the congress, which will be held under the theme “A billion smiles welcome the world of dentistry”, is in line with its and the government of India's ambitious goal to achieve optimum oral health for all.

“We are delighted that the FDI has once again chosen India for its landmark event—it is a wise choice,” Gurav said.

The decision to host the next congress in India was made back in May. Exactly ten years after the congress took place in New Delhi, the event will be hosted by the FDI in collaboration with the Indian Dental Association. The association currently has over 50,000 members and operates through 28 state branches, more than 350 local branches and 1 defence branch. It aims to achieve optimal oral health for every Indian by 2020.

India currently boasts the largest dental workforce in the world. In addition, an estimated 20,000 dental students graduate from the country’s 301 dental schools every year. The market there, worth around US$50 million according to industry experts, offers huge growth opportunities for dental manufacturers, especially for producers of dental implants and prostheses.

Besides an impressive scientific programme, the congress in New Delhi will feature early breakfast meetings and Meet the Experts sessions aimed at bringing together the experts in a specific subject and a small group of dentists in an interactive setting, the Indian Dental Association said. Hands-on courses supplementing the lectures will provide a more intimate and constructive learning environment designed to develop clinical skills and practices relevant to modern dental practice and today's cutting-edge dentistry.

The Year in Review meetings, introduced at the centenary congress in Hong Kong last year will provide additional focused learning opportunities. Interactive discussions on practical cases will deal with specific cases discussed directly with prominent speakers.

As reported by The New York Times online, the annual number of hospitalizations increased by more than 40 percent from 5,757 in 2000 to 8,141 in 2008.

According to the scientists, 89% of all the hospitalizations occurred on an emergency basis. The mean length of stay was 2.96 days. The average age of patients admitted for reasons related to dental care was 37. More than 18 percent of the patients had no insurance.

As dental professionals, however, we stand with the preventive model? Unfortunately, at a congress like the FDI AWDC here in Istanbul, most dentists want primarily to attend presentations in fields like cosmetic dentistry and implants. Those are the major topics that they are interested in, and I do not blame them because implants can generate a lot of revenue. As dental professionals, however, I think we owe it to our patients to adopt a preventive philosophy. If we do the right thing, it can be rewarding as well financially. So, if you ask me when we are going to reverse this trend, I do not have an answer for you but as a dental association it is our responsibility to teach prevention and ensure that dentists understand what that means.

Thank you very much for the interview.
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only systems and a chairside CAD/CAM System, E4D Dentist (Fig. 1). There still isn’t just one system that can complete all of the restorative indications we have in dentistry. It is my preference to select the techniques and materials that excel in a particular area, rather than compromise to have one system that says it does a little of everything. For me and my practice (a prosthodontics practice located in Monterey, CA), all of my single-unit restorations are fabricated using the E4D Dentist System. In addition, with the opening of E4D Sky™ Network and the newest version of the E4D’s DentacLogic software, more and more of my total restorative care will be touched by digital technologies on a daily basis.

When you are first introduced to CAD/CAM chairside dentistry, you have the opportunity to refine your thinking on restorative care. You’ll no doubt become a better diagnostician and clinician—because of looking at your preoperative conditions and preparations on a large monitor— but also a better and more confident provider of when to do what in different clinical situations. Given the number of restorative materials available at your fingertips, you’ll make betterdecided decisions with each particular patient situation. Using the E4D Dentist system, you have access to a number of proven materials (blocks), each with either an Ivoclar Vivadent or 3M ESPE logo on it, so you know exactly what you are getting. The abundance of material options allows you to select the best one for the given clinical situation. A quick review of what is available follows.

**_Block Party attendees_**

**Resin**

In the category of resin, you have the option to select the Paradigm MZ100 block from 3M ESPE. Complementing the success of the direct restorative Filtek Z100, this block contains ceramic particles with an average size of 0.6 microns with cross-linked monomers that provide the ideal wear resistance, strength and radiopacity necessary for posterior use. It use it primarily for partial coverage restorations as well as some indirect restorative Filtek Z100, this use. I use it primarily for partial restorations requires placement using an adhesive cementation protocol.

I personally have an onlay restored with MZ100 in my own mouth, tooth #3. When compared to conventional feldspathic porcelain restorations fabricated with chairside CAD/CAM, the Paradigm MZ100 restorations showed better colour match through ten years. This study also showed no difference in margin finish, surface finish, anatomical form, caries or sensitivity. The authors actually concluded that “the composite inlays performed as well as the porcelain inlays with less bulk inlay fracture.” In an in vitro fatigue study on occlusal veneer restorations, Paradigm MZ100 had significantly higher fatigue resistance (100% survival at 185,000 cycles up to 1,400 N loads) compared to CAD/CAM feldspathic porcelain (0% survival).

**Resin nano ceramic**

A new category for chairside CAD/CAM dentistry is the resin nano ceramic created with the introduction of the new Lava Ultimate block. This material defines a new category, resin nano ceramic, which provides some unique and beneficial characteristics for us to have for chairside. We know that 3M ESPE and Ivoclar Vivadent have made some developments with zirconia restorations and they’ve expanded this technology to additional digital applications. Lava Ultimate material contains a blend of three fillers: zirconia and silica nanoparticles agglomerated into clusters, individually bonded silica nanoparticles and individually bonded zirconia nanoparticles.

Lava Ultimate contains approximately 79% (by weight) of this filler blend that reinforces a highly cross-linked polymeric matrix cured using a proprietary manufacturing process. The result is a unique block with indications for chairside fabrication (blocks and use). It’s indicated for a full range of permanent, adhesive, single-unit restorations including crowns, onlays, inlays and veneers. The material is ideally suited for implant supported restorations (Figs. 2 & 3) because of its high 200 MPa flexural strength (higher than conventional feldspathic blocks and laying ceramic used in metalceramis) and relatively low modulus (compared to ceramics).

From a time management standpoint, I personally have an onlay restored with MZ100 in my own mouth, tooth #3. When compared to conventional feldspathic porcelain restorations fabricated with chairside CAD/CAM, the Paradigm MZ100 restorations showed better colour match through ten years. This study also showed no difference in margin finish, surface finish, anatomical form, caries or sensitivity. The authors actually concluded that “the composite inlays performed as well as the porcelain inlays with less bulk inlay fracture.” In an in vitro fatigue study on occlusal veneer restorations, Paradigm MZ100 had significantly higher fatigue resistance (100% survival at 185,000 cycles up to 1,400 N loads) compared to CAD/CAM feldspathic porcelain (0% survival).

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Single Molar Restoration: Wide implant versus two conventional

Authors: Prof. Amr Abdel Azim, Dr Amamri M. Zaki & Dr Mohamed I. El-Anwar, Egypt

The single-tooth restoration has become one of the most widely used procedures in implant dentistry. In the posterior region of the oral cavity, bone volume and density are often compromised. Occlusal forces are greater in this region, and with or without parafunctional habits, can easily compromise the stability of the restorations (Fig. 1).1

The single-molar implant-supported restoration has historically presented a challenge in terms of form and function. The mesiodistal dimensions of a molar exceed that of most standard implants (3.75 to 4.0 mm), creating the possibility of functional overload resulting in the failure of the retaining components or the failure of the implant (Figs. 2 & 3).1,3 Wider-diameter implants have a genuine use in smaller molar spaces (8.0 to 11.0 mm) with a crestal form and function. The mesiodistal and premolar area. 23

Single molar restoration—Wide implant versus two implants on standard Brånemark implant

The second phase of difficulty might appear for solving the engineering problem, is importing and manipulating three parts one scanned and two modeled or drawn parts on a commercial FE package. Most of CAD/CAM and graphics packages deal with parts as shells (outer surface only). On the other hand, the stress analysis required in this study is based on volume of different materials.2 Therefore set of operations like cutting volumes by the used materials in this analysis

The concept of using 2 implants requires the availability of a strong and stable implant having a minimum diameter of 3.5 mm. Additionally, the associated prosthetic components should ideally not exceed this dimension.3

Finite element analysis (FEA) is an engineering method that allows investigators to assess stresses and strains within a solid body.4-6 FEA provides calculation ofstresses and deformations of each element alone and the net of all elements. A finite element model is constructed by breaking a solid object into a number of discrete elements that are connected at common nodal points. Each element is assigned appropriate material properties that correspond to the properties of the structure to be modeled. Boundary conditions are applied to the model to simulate interactions with the environment.1

This model allows simulated force application to specific points in the system, and it provides the resultant forces in the surrounding structures. FEA is particularly useful in the evaluation of dental prostheses supported by implants.12,12a Two models were subjected to FEA study

Table 1: Material Properties

<table>
<thead>
<tr>
<th>Material</th>
<th>Poisson’s ratio</th>
<th>Young’s modulus MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coating (Porcelain)</td>
<td>0.3</td>
<td>67,200</td>
</tr>
<tr>
<td>Restoration (Gold)</td>
<td>0.3</td>
<td>96,000</td>
</tr>
<tr>
<td>Implants (Titanium)</td>
<td>0.35</td>
<td>110,000</td>
</tr>
<tr>
<td>Spongy bone</td>
<td>0.3</td>
<td>150</td>
</tr>
<tr>
<td>Cortical bone</td>
<td>0.26</td>
<td>1,500</td>
</tr>
</tbody>
</table>

Table 2: Results

<table>
<thead>
<tr>
<th>Difference %</th>
<th>Porcelain coating</th>
<th>Gold crown</th>
<th>Implants</th>
<th>Spongy bone</th>
<th>Cortical bone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ux</td>
<td>-17.86</td>
<td>-16.70</td>
<td>-8.18</td>
<td>-0.28</td>
<td>-19.57</td>
</tr>
<tr>
<td>Uy</td>
<td>-11.10</td>
<td>-11.10</td>
<td>-2.72</td>
<td>-0.03</td>
<td>-19.62</td>
</tr>
<tr>
<td>Uz</td>
<td>31.59</td>
<td>-179.99</td>
<td>-6.72</td>
<td>5.96</td>
<td>-37.17</td>
</tr>
<tr>
<td>Sx</td>
<td>0.71</td>
<td>-33.44</td>
<td>-31.04</td>
<td>-11.24</td>
<td>-70.43</td>
</tr>
<tr>
<td>Sy</td>
<td>-1.26</td>
<td>-18.06</td>
<td>-46.39</td>
<td>4.75</td>
<td>-41.82</td>
</tr>
<tr>
<td>Sz</td>
<td>0.23</td>
<td>-10.22</td>
<td>-196.88</td>
<td>4.00</td>
<td>-39.17</td>
</tr>
</tbody>
</table>

On the other hand, crown is too complicated in its geometry therefore it was not possible to draw it in three dimensions with sufficient accuracy. Crown was modeled by using three-dimensional scanner, Roland MDX-15, to produce cloud of points or triangulations to be trimmed before using in any other application.

The second phase of difficulty might appear for solving the engineering problem, is importing and manipulating three parts one scanned and two modeled or drawn parts on a commercial FE package. Most of CAD/CAM and graphics packages deal with parts as shells (outer surface only). On the other hand, the stress analysis required in this study is based on volume of different materials.2 Therefore set of operations like cutting volumes by the used materials in this analysis

Figure 1: Load distribution during mastication shows marked increase in the molar and premolar area.

Figure 2: Occlusal view showing a missing first molar. The mesio-distal width is very wide and restoration couldn’t compensate it leaving a space distally.

Figure 3: Proximal cantilever shown radiographic view of maxillary right first molar on standard Brånemark implant with standard abutment (Noel Beckers)/

Figure 4A: Radiographic view of wide implants used to restore missing lower first molars.11a

Figure 4B: Buccal view of 2 standard 20-degrees abutments on 3.5 mm Antra Tech implants for restoration of mandibular right first molar.11a

Figure 4C: Radiographic view of the restoration.11a

Figure 4D: Radiographic view of wide implant versus two implants on standard Brånemark implant with standard abutment (Noel Beckers)/

Figure 5: Crown, implants and bone assembled in a model (FEA software used element in meshing all three dimensional model is eight nodes brick element (SOLID 86), which has three degrees of freedom (translations in the global directions). Listing of the used materials in this analysis is found in Table 1. The two models were subjected to 120 N vertical load equally distributed (20 N on six points simulate the occlusion, one on each cusp and one in the central fossa). On the other hand, the base of the cortical bone cylinder was fixed in all directions as a boundary condition.11a

Results and Discussion

Results of FEA showed a lot of details about stresses and deformations in all parts of the two models under the scope of this study. Figures 6a & b showed a graphical comparison between the crowns of the two models which are safe under this range of stresses (porcelain coating, gold crown, and implants showed the same ranges of safety). No critical difference can be noticed on these parts of the system. All differences might be found due to differences in supporting points and each part volume to absorb load energy (equation 2.8).

Generally a crown placed on two implants is weaker than the same crown placed on one implant. This fact is directly reflected on porcelain coating and the two implants that have more deflections. Comparing wide implant model with the two implants from the geometrical point of view it is simply noted that cross sectional area was reduced by 43.3 % while the side area increased by 6.5 %. Using one implant results as a reference in a detailed comparison between the two models by using equation (1) resulted in Table 2 for porcelain coating, gold crown, implants, spongy and cortical bones respectively.

Difference % = (One implant Result— Two implants Result)*100/One implant Result …(1)

Spongy bone deformation and stresses (Table 3) seems to be the same in the two cases. Simple and fast conclusion can be taken that, using one wide implant is equivalent to using two conventional implants. On the other hand a very important conclusion can be exerted that, under axial loading, about 10% increase in implant side area can overcome reduction of implant cross section area by 50%. In other words, effectiveness of increasing implant side area might be five times higher than the increasing of implant cross section area on spongy bone stress level under axial loading. Starting from Figure 7 a & b, slight differences can be noticed on spongy bone between the two models results. The stresses on the spongy bone are less about 5% in the two implants model than the one wide diameter implant. The exceptions are the relatively increase in maximum compressive stresses and deformations of order 12% and 0.3% respectively. The bone is known to respond to the best by compressive and the least to shear stresses15, so considering the difference in compressive stresses less significant, the two implants were found to have a better effect on spongy bone. Contrarily, Figures 8 a & b, showed better performance with cortical bone in case of using one wide implant over using two implants, that, deformations.
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The most important years in implantology

A personal retrospective

Author: Dr Georg Bach, Germany

Introduction

It all started with an inquiry from a well-known professional journal of implantology asking for a contribution to acknowledge their having been in business for 15 years. What a coincidence, I thought, that was the incidental telephone call by an academic teacher who had accompanied and supported me in my first steps in implantology. When I asked him about the upcoming publication project, I received a both spontaneous and surprising reply, “The last 15 years—those were the most important years in implantology!” This from a renowned university professor who was instrumental in establishing implantology—I was impressed. Later on I had to ask myself, “Is this really true?” The result of my tracing this development is this article—a personal retrospective.

Phases of implantology

If one considers oral implantology with regard to its major developments, three phases are evident: (i) the empirical and experimental phase; (ii) the arrival of implantology in universities and science; (iii) the mass phenomenon of implantology. I would like to add that this is a rough and probably superficial division to some extent. Phase, however, does not allow me to apply it within the scope of this personal—and not exhaustive—review.

Looking back at these past fifteen years, I will barely touch on phase II, but will discuss phase III fully. This email's different directions and priority areas that colleagues working in implantology experienced. When I browsed through implantology textbooks and journals from this period, I realized even more that implantology had undergone considerable change in this relatively short period of 15 years. I would like to recount my highlights of implantology from this period in the following paragraphs.

Farewell to the tristesse of papers

A seemingly minor issue to start with: the variety and quality of dentistry-specific print media and of digital media, particularly print layout, has developed substantially during the past 15 years. This holds true not only for implantology, but also for dentistry as a whole. The appearance of some professional journals up until the mid-1990s was reminiscent of an official legal amendment, but amazing things have happened since. The quality of colour printing (which is the norm now, but used to be considerate for authors who wanted to include colour images), the accuracy of images, the paper—all of these make for a high quality appearance and leave a lasting impression on the reader. This has clearly been an advantage also for implantology because now highly complex correlations can be more easily conveyed and “sometimes a picture is worth a thousand words”. Ideally, e-learning and electronic professional journals supplement the current training needs of the younger generation of dentists especially.

The end of dogmas

While implantology was marked by many dogmas from its beginning and the mid-1990s, this had changed at the time when our 15-year observation period begins. However, implantology was later called into question in its entirety. Whether it was healing times, waiting times after augmentation or prosthetic concepts—everything underwent scrutiny. On the one hand, some of these dogmas did in fact prove to be no longer sustainable because of remarkable developments, especially improvements in implant surfaces. On the other hand, the mark was at times overstepped in the elimination of other dogmas, creating the need to backtrack. This was a painful experience for both patients and implantologists.

One dogma that we encountered in the observation period was that of a strict refusal of immediate implant placement. There is general consensus today, however, that under suitable conditions an immediate implant placement can be a high quality and sustainable alternative to established procedures. One clinical case shows an immediate implant placement in the maxillary anterior teeth: the extraction and the immediate implant placement of a maxillary anterior tooth that was not worth preserving under the guidance of a drilling template and implant position (Fig. 1), transfer into the oral cavity (Fig. 2), and the condition immediately after insertion of the implant crown (Fig. 3).

The prospering of the implant market

A welcome variety of new implants, implant forms and prosthetic options has become a reality in the past 15 years. Special implants were developed for special indications so that now even a mandibular molar is replaceable by a corresponding sized implant, followed by insertion of a corresponding sized implant crown. Figures 4 to 7 show the clinical and dental appearance of these in a patient. Implantologists who placed several hundred implants annually were considered the big players on the implant market in the 1990s. Achieving the mark of 100,000 implants placed per year in Germany signified that the peak had been reached. This was not the case, since the one-million mark was also reached within the scope of a rapid, almost unimpeded development. While the increase has been slower in recent years and global economic developments even caused a brief decline, today we can assume that the implant market will continue to grow.

The maximum growth phase falls into our observed period.

Development in the eyes of implant manufacturers

From manufacturer to global player—this would be an accurate description of the development of some implant manufacturers. The development of some of these companies over the past 15 years, the size of their companies and the number of their employees today are indeed impressive. And these prosperous companies share other characteristics as well: the acquisition of products and entire firms in order to expand or supplement their product portfolio and their pressing on to the field of digital dentistry (CAD/CAM, planning, etc.), into which these global players invest large sums of money. Revenues must be generated so that these investments can be made—and they are still made, albeit declining owing to the economic crisis.

Still, the implant market is booming. Although the consistently two-digit annual growth rates some implant manufacturers had started to become used to have become more moderate today, a great deal of money can be made with implants. As a result, an ever-increasing number of implant suppliers and systems make it impossible for the individual user to keep track. Aside from new systems, an increasing number of generics are being launched on the market.

Focus on red-white aesthetics

The President of the German Society for Dental Implantology (Deutsche Gesellschaft für Zahnärztliche Implantologie), Prof. Frank Palm, aptly remarked, “What was celebrated as a triumph for some colleagues 20 years ago is today taken for granted.” Dentists working today are not prepared to find themselves confronted with a debate that had spread from North America to Europe: that of red-white aesthetics. This new focus on achieving the highest possible aesthetics for implant-prosthetic treatments was linked to implantology and distanced itself from surgery, which had been dominant up until that time.

In the early phase of implantology, the main focus was on safe placement and the best possible placement in the bone, sometimes even at the expense of subsequent prosthetic treatment owing to unfavorable implantation of the artificial abutment teeth. Now, however, prosthetic standards and issues have become the centre of the current discussion. Prosthetic techniques were modified and new techniques were established in order to satisfy these requirements. Patients no longer, or not to the same extent, place importance on the implant market will continue to grow.

Both implants in the anterior maxillary region were placed too far bucally, and there was a gap of 5.5 mm between the implant shoulder and the cemento-enamel junction of the adjacent teeth (Figs. 8–10). Treatment with a long-term temporary restoration would only have yielded an unsatisfactory aesthetic result. However, under certain surgical and prosthetic conditions—as shown in our second example—superior results and stability for a period of ten years can be achieved even with challenging initial situations. In 1999, an immediate implant was placed in region 12. The following images show the steps of treatment (Figs. 11–13). The last image shows the condition after ten years (Fig. 14).

This development was made possible mainly by massive improvements in the area of augmentations, which can now be performed with significantly higher predictability. This development was further enhanced by a considerable improvement in the training of implantologists. These improvements are significant for both undergraduate study and postgraduate training. Thus, the training of implantologists and professional associations who have contributed immensely in this area deserve much credit in this respect.

The battle of healing times

It was but an episode, yet one that caused an incredible favor at the time: the debate about shortened healing times. Stimulated by a media hype for Dental Tribune, the peak had been reached. This was not the case, since the one-million mark was also reached within the scope of a rapid, almost unimpeded development. While the increase has been slower in recent years and global economic developments even caused a brief decline, today we can assume that the implant market will continue to grow.

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appeared to be in the lead, the healing times and implant manufacturers were inflated. Values were corrected downwards almost on a daily basis. Some manufacturers went along with it, while others remained firm. Some participants felt they needed to be at the forefront, others stayed out of it. A short but remarkable ascent was followed by a rapid crash.

A personal highlight for me was an article in a tabloid newspaper that said: “The conclusion in the morning followed directly by augmentation and implantation; a firmly seated supra-construction implemented at lunchtime...”

Standards with regard to these new planning programs and aids were especially important. The suggestion by some opinion leading professional associations of implantology—this phenomenon does not exist and, if it occurs, it can be reduced considerably, but not at any cost.

The afore-mentioned dominance of prosthodontic implantology was only possible because many new and safer augmentation procedures were established during the observation period, enabling dentists to design the osseous bed for the implant as desired.

Revolutionary augmentation procedures in the area of the maxillary posterior teeth, which had been the focus of discusssions during the beginning phase of implantology in question, constituted another important approach for real progress.

Thanks to surgical techniques for sinus lifts, which underwent an incredible number of modifications also with regard to less invasive procedures, it was possible to treat even areas of the jaw that had previously been considered impossible or that could only be restored for implantation by way of highly invasive orthodontic procedures. While initial sinus-lift procedures were generally reserved for highly specialised centres, they have now become common knowledge in implantology and are offered and performed extensively.

Establishing virtual implantology

It seems easy to figure out what the old-school fraction must have thought about the new planning and placement options for oral implants. This fraction had already had a hard time accepting the development from surgical to prosthetic implantology, and they were strictly against the new digital procedures that were emerging incredibly quickly. With the rapid spread of dental volume tomography, which opened a new dimension to dental image diagnostics, a multitude of planning programs and aids were placed on the market.

The suggestion by some opinion leaders, quality and establish standards with regard to these new techniques, which are generally based on 3-D X-ray data, was especially frustrated upon. I feel that a good compromise has been reached, owing to anticipatory and serious discussions held during congresses and congresses, as well as at universities and within the dental associations.

These new techniques are immensely helpful in the treatment of complex cases, and they are even indispensable for highly complex cases. The treatment of simple cases usually does not require the use of these techniques. In fact, they should not be used in such cases owing to the radiation exposure when obtaining 3-D data.

Of promises and realities

The themes of the congresses during the first decade of the observation period contained generally positive statements and depicted new opportunities in implantology, which exceeded the then current options by far and expressed a belief in boundless growth. This coincided with many positive statements and evaluations by implant manufacturers and factoriers. However, all this changed considerably during the past five years.

Suddenly, new topics were given priority, which shaped specialists’ conventions—topics that had previously been partially suppressed if not neglected. I remember too well the implant congress held by a very important American implant manufacturer in Frankfurt/Main in 1998, where I reported on a concept for the treatment of peri-implantitis developed at the University of Freiburg and was then rebuffed by the main speaker, who was from the USA, during the ensuing panel discussion. He asserted that he had “not seen one case of peri-implantitis in twenty years of implantology—this phenomenon does not exist with it, if it occurs, it can only be attributed to a lack in skill on the part of the implantologists.”

How times have changed. However, trouble-shooting and complications in implantology and even the word “failure” have been mentioned in the themes of many congresses held by leading professional associations of implantology in the past years.

Patients’ expectations

While a consistently positive and at times even euphoric tone prevailed regarding the topic of implants for many years, a few critical voices and later increasing criticism emerged at the beginning of the observation period. This was—concurrent with a noticeable increase in the number of implants—based on the considerable increase in implantology failures and complications. The following images depict total implantological failure—the loss of a purely implantsupported restoration owing to an infaust peri-implantitis (Figs. 15–17), leaving profound osseous defects.

However, in line with the consistently positive evaluation of implants and the persisting promise that the use of implants would yield optimum results always—and often publicised by the lay press—our patients’ expectations have increased considerably in the past 15 years. Patients assumed that, regardless of the individual situation, he or she would always receive the optimum results. In this regard, it seems reasonable to maintain a self-critical attitude and to concede that we do not always contradict this general assumption vehemently enough.

And then what was bound to happen, happened at times, the result was not what the patient had expected. An awkward situation arises when the dentist, based on the initial diagnosis, considers the result to be successful and the patient considers it a failure. A long-time legal expert sums up this situation accurately by stating, “Two-thirds of all pending court proceedings were filed by patients whose expectations were disappointed.”

Rather unfortunately, the increasing number of court proceedings are mostly related to implantology. It cannot be by chance that the premiums for mandatory professional liability insurance have increased considerably.

Emerging criticism

German periodontist Dr Thomas Kocher referred to implantology as “the red light district of dentistry.” Whether this evaluation is justified is a matter to be decided individually. Personally, I do not agree with this evaluation, but a grain of truth might be found in its reference to over-treatment. In this regard, the extraction of teeth in favour of implants, even when not indicated, is a concern voiced increasingly by periodontists and those in favour of conservative treatment. We have to address this issue by individual evaluation of each patient, as well as through academic discussion. Implant versus tooth preservation has been a frequent debate at conventions and implant symposia in recent years. In my opinion, this would not have been possible ten years ago.

Trouble-shooting concepts

Unexpected complications, such as implant fracture and failure of implant suprastructure connections (Figs. 18–21), necessitated the development of surgical and prosthetic trouble-shooting concepts and modification of constructions in implant and abutment design. However, these concepts were not readily available and have not yet been finally agreed upon. In other words, they cannot be said to be common knowledge in implantology, at least not in the treatment of peri-implantitis. Similar statements can be made with regard to pre-implantology arguments, where a pleasuring variety of surgical techniques and materials is listed, but no generally valid scheme has been agreed upon.

The fact that the need to develop and convey these trouble-shooting concepts is generally recognised today and that these concepts are yet widely supported by the practitioners on the implant market is gratifying. The specialist press has made a valuable contribution to this task, but they do so—numerous articles that received a great deal of attention during the past 15 years are those that dealt with implantology and implant-prosthetic trouble-shooting.

Digital implantology

I consider the establishment of 3-D diagnostic imaging, with all associated possibilities, to be the significant development during the 15-year observation period. It is true that only implantologists used the new 3-D technology during the initial phase of dental volume tomography (because they made the group of dentists who could actually afford this expensive equipment); nevertheless, 3-D technology constituted a quantum leap for dental diagnostic imaging as a whole.

Today, we have almost unbelievably possibilities at our disposal that even the greatest optimists would not have considered possible 15 years ago: highly complex patient cases can now receive minimally invasive treatment and implant planning placed even without the need for augmentation.

Our first case shows a highly ambitious mandate with four implants could be placed without any prior augmentation owing to 3-D data and planning (Figs. 22–24). Three-dimensional diagnostics are sometimes also employed to clarify facts when complications have arisen, for example neural lesions after implantation (Figs. 25 & 26) and bone necrosis after administration of bisphosphonates, and erroneously diagnosed as peri-implantitis (Fig. 27).

My personal conclusions

It is difficult to draw a conclusion regarding the development of implantology during the last 15 years because it has been so multifaceted and rapid. To conclude, I would therefore like to quote my academic teacher and former supervisor, Prof Wilfried Schibli, who, as a founding member of the International Team for Implantology, was undoubtedly among the pioneers of implantology and has contributed to improving implantology through his university work, “Who would have thought that implantology could develop like it did in less than twenty years.”

This very true statement encompasses many aspects: the admiration and appreciation of what has been achieved, the satisfaction with having the opportunity to contribute to something that is considered to be the safest in the entire field of medicine, and some criticism regarding any development in oral implantology that did not turn so well or went off course.

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Fabrication of a customised implant abutment using CAD/CAM: A solution specific to each clinical case

Author: Dr Thierry Lachkar, France

The multiplicity and sophistication of the offering in the field of prosthetic elements in implantology allow the practitioner to make a choice appropriate to the clinical particulars of each case. If the practitioner chooses a standard implant abutment, the dental technician will have to make adjustments, which implies considerable losses in precision and time. Moreover, with such abutments it is difficult to create an anatomical emergence profile because it cannot be modified and the base of the abutment cannot be changed. This observation is equally applicable to the angulation, which might even be selected by default.

A customised abutment created with CAD/CAM is the most accurate and simplest solution for an optimal result. The abutment is individually designed in order to ensure the homotheticity of the thickness of the materials and therefore the overall strength of the prosthesis. The dental technician has in this case maximum freedom in terms of design in order to create an abutment with the optimum emergence profile and angulation. In this manner, the abutment is specifically designed and fabricated for each patient.

Titanium has been established in dental implantology as the reference material owing to its biomechanical properties and its biocompatibility. Today, we are able to benefit from over 40 years of clinical and experimental experience in implantology. Customised abutments can be fabricated from titanium, zirconia or hybrid materials, such as a combination of titanium and zirconia, which in certain clinical circumstances improves the aesthetics of the visible areas while respecting the requirements of biocompatibility and bio-mechanics.

Seating a four-unit bridge on three anatomical implant abutments

Clinical case
A 40-year-old male patient presented for treatment. He had no particular medical conditions or any contraindications concerning the placement of implants. In 2009, the patient had undergone a sinus lift (an increase of the maxillary bone volume and the displacement of the sinus membrane to ensure implant success by increasing the height of the available bone) at a hospital prior to the placement of implants to replace teeth 15–17. The postoperative sequelae (pain, oedemas, etc.) resulted in the patient being entirely opposed to another intervention of this kind on the opposite side of the mouth.

During an appointment in October 2013, I was able to persuade the patient to accept implant treatment. I suggested first removing the three unit bridge on teeth 23–25 and then extracting the roots of teeth 23 and 25, as well as seating of a denture on the day of the extraction, followed by placement of three implants in regions 23–25, the extraction of tooth 26, and seating of a four-unit bridge as the final prosthetic solution.

As the height of the available bone around tooth 26 was insufficient, I would not place an implant in that area but a tooth extension a sinus lift would otherwise have been essential. The treatment plan was accepted by the patient two weeks later, and teeth 23 and 25 were extracted at the end of the month. The patient was seen on 10 January 2012 for implant placement: two implants (NobelReplace RP; Nobel Biocare) with a diameter of 4.3 mm and a length of 13 mm for regions 23 and 24, and one implant (NobelReplace WP); with a diameter of 5 mm and a length of 10 mm for region 25. Tooth 26 was extracted on the same day without placement of an implant as already mentioned.

In May 2012, implant-level impressions were taken (open-tray impression technique) and the cast was recorded using silicone and a bite tray. Owing to the constraints related to the angulation of the implants in regions 24 and 25, I opted for titanium abutments. The angle of the implant in region 23 allowed for the insertion of a titanium–zirconia abutment for good gingival grip and a better aesthetic result.

Ten days later, two titanium abutments (ANA. T, Laboratoire Dentaire Crown Ceram) and one titanium–zirconia abutment (ANA. TZ, Laboratoire Dentaire Crown Ceram) were screwed onto the implants at a torque of 35 N, and sealed with composite. An adjustment check of the contact points and of the occlusion was performed, followed by cementation of a ceramic bridge with a zirconia framework. A follow-up visit took place three days later.

Technique
For this case, it was possible to use abutments made from different materials according to the angulation of the implant: titanium for the anterior region, zirconia for the premolar region, and a combination of titanium and zirconia for the angle of the implant in region 23 but I opted for the titanium–zirconia abutment to obtain a better aesthetic result in the anterior region: brightness, translucency and no visible metal margin. Customised CAD/CAM prosthetic elements and abutments respect the dental anatomy and allow extremely precise seating of a bridge on implants. Periodontal maintenance is therefore easier owing to easy access with a toothbrush because of the predetermined interdental spaces.

The simplicity of the process saves a considerable amount of time: no adjustments are necessary, the bridge is seated immediately, the occlusion is usually ideal, and greater accuracy can be achieved. In addition, only two appointments are necessary: one for impression taking and another for seating of the bridge.
Guided implant surgical placement with CAD/CAM CEREC crown

Author, Dr Nilesh Parmar, UK

Guided surgery has been around for a long time. However, very few dentists in the United Kingdom place implants using surgical guides. The reasons for this are multiple, ranging from dentists not wanting to follow the procedure, or not having confidence in the procedure, the increased costs of guide fabrication, and the time delay and extra appointments needed to obtain a fully functional and reliable surgical guide.

In this case report, I shall demonstrate a surgical guide manufactured in-house using the CEREC Bluecam (Sirona). These guides do not require any impressions to be sent to a third party and can be made rather cheaply in the surgery within around 30 minutes. The guide can then be used in conjunction with specific drill keys, which are compatible with the guided surgery drill sets from all leading implant manufacturers.

In this particular case, Facilitate (Astra Tech/DENTSPLY Implants) was used to place the implant. Once the implant was osseointegrated, the final restoration was fabricated chairside using the CEREC MC XL milling machine (Sirona) and an IPS e.max CAD block (Ivoclar Vivadent).

Case report

A young female patient had lost tooth 36 a few years ago and wanted an implant solution. Her medical history was clear and she had a mildly restored dentition with no current dental pathology. Her BPE scores were low, with excellent oral hygiene.

The patient was scanned using the CEREC Bluecam and a proposal for the missing tooth was created. A calibrated CBCT scan of the lower jaw was taken using GALILEOS (Sirona) with a CEREC Guide reference body with CEREC Bluecam. A high primary stability of 40 Ncm was obtained and a 4 mm healing abutment was placed immediately. The patient healed with no pain, no swelling and no discomfort. The post-operative long-cone periapical radiograph corresponded well with the preoperative planning with an ideal angulation for a screw-retained crown. After two months of healing, a fixture-level open-tray impression was taken and cast up using an Astra Tech replica. A standard metal abutment was prepared in accordance with a standard sterile protocol and the area anaesthetised as one would for a regular implant placement. The surgical guide snaps firmly over the existing teeth, expanding over- and undercuts, becoming a very stable platform through which to drill.

In this case, an Osseo-Speed TX implant (DENTSPLY Implants) (4.0 x 11 mm) was placed using the surgical guide. The patient decided, the information was ported to the CEREC software and a CEREC Guide bloc a drill body was milled by the CEREC MCXL milling machine. Once this has been milled, it will lock tightly into the thermoplastic drilling template. At this point, the surgical guide is complete and can be used on the patient.

In this particular case, an Osseo-Speed TX implant (DENTSPLY Implants) (4.0 x 11 mm) was placed using the surgical guide. The patient was prepared in accordance with a standard sterile protocol and the area anaesthetised as one would for a regular implant placement. The surgical guide snaps firmly over the existing teeth, expanding over- and undercuts, becoming a very stable platform through which to drill.

The Facilitate soft-tissue punch was used to remove the overlying soft tissue, and a standard drilling protocol using the Sirona drill keys was followed.

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The surgical guide snaps firmly over the existing teeth, expanding over- and undercuts, becoming a very stable platform through which to drill.

The Facilitate soft-tissue punch was used to remove the overlying soft tissue, and a standard drilling protocol using the Sirona drill keys was followed.

Once the implant position had been

Figure 1: Reference body with CEREC Guide mill block.
Figure 2: Thermoplastic warmed in hot water and placed over the working model.
Figure 3: Reference body and thermoplastic surgical guide.
Figure 4: Reference body and thermoplastic guide in-situ prior to CBCT scan.
Figure 5: CBCT with reference body and CEREC proposal overlay.
Figure 6: CEREC Guide in-situ.
Figure 7: AstraTech/DENTSPLY Implants fixture level open-tray impression.
Figure 8: Soft tissue removed.
Figure 9: Directional indicator to assess osteotomy position.
Figure 10: Implant placement.
Figure 11A: Placement of a 4 mm healing abutment at stage 1.
Figure 11B: Post-op RTG view.
Figure 12: Fixture level open-tray impression.
Figure 13: Standard abutment with 3 mm of occlusal clearance.
Figure 14: Soft tissue profile after two months healing.
Figure 15: CEREC image of the abutment.
Figure 16: CEREC image of final restoration.

Contact Info


He has a master’s degree in Prosthetic Dentistry from the Eastman Dental Institute and a master’s degree in Clinical Implantology from King’s College London. He is one of the few dentists in the UK to hold a degree from all three London dental schools and recently obtained his Certificate in Orthodontics from the University of Warwick. His main area of interest is dental implants and CEREC CAD/CAM technology.

Nilesh runs a successful five-surgery practice close to London and is a visiting implant dentist at two Central London practices. Nilesh has a never-ending passion for his work and is well known for his attention to detail and his belief that every patient he sees should become a patient for life. He offers training and mentoring to dentists starting out in implant dentistry. More information can be found on his website, www.drnileshparmar.com; Twitter: @NileshRParmar; or Facebook: Dr Nilesh R. Parmar.
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was inserted into the replica and cut back by 3 mm from the occlusal table. This was then powdered and scanned using the CEREC Bluecam, and an IPS e.max CAD C 14 block was milled.

The CEREC 4.2 software was instructed to mill a hole that corresponded to the screw-insertion path on the abutment. This was finished using a high-speed diamond bur with copious irrigation. The crown was glazed and sintered, allowed to cool and bonded to the abutment using Variolink II (Ivoclar Vivadent). The final crown was screwed directly onto the implant and a final check for contacts and occlusion was done.

This process shows just how far CADCAM technology has come. An implant can be planned, inserted and restored all in-house, using the current available technology. The final result is equal to any laboratory-based restoration, albeit for simple units. The process does have its limits in terms of multiple-span bridges and placement of multiple implants, especially in edentulous areas. As the technology develops, with further advances being made, the scope of what is possible for the implant dentist is always expanding.

**Dental technician’s perspective**

When the laboratory (Laboratoire Dentaire Crown Ceram) received this case, we were asked to create three customised anatomical abutments with a titanium interface for an individual and more precise fit, respecting the requirements of biocompatibility and biomechanics, and a coronary part in zirconia for a better aesthetic result.

Once the moulds had been cast, we determined that the considerable angulation of the implants in regions 24 and 25 and their shallow position in the tissue posed difficulties regarding the design of titanium–zirconia abutments. However, Dr Lachkar explained to us that in this case (i.e. the patient’s reluctance to undergo pre-implant surgery) he was forced to place the implants in the bone available and not necessarily in the ideal situation according to a prosthetic plan.

In this case, the titanium interface would have considerably exceeded the buccal surface and it would therefore have been necessary to reduce it. The bonding surface would therefore have been limited, which would have resulted in a great loss of mechanical resistance. We thus decided to use a titanium abutment manufactured from a single block and specially made to allow for such substantial angulations for teeth 24 and 25. For tooth 23, the implant angle allowed for a titanium–zirconia abutment, which was preferred to a titanium abutment for a better aesthetic result.

This study showed various results between cortical and spongy bone. It was expected that the maximum stresses in the cortical bone was placed in the weak area between the two implants. In addition to be higher than the case of using one wide implant. Although the middle part of spongy bone was stressed to the same level in the two cases, using two implants resulted in more volume of the spongy bone absorbed the load energy, which led to reduction of stress concentration and rate of stress deterioration by moving away from implants. That is considered better distribution of stresses from the mechanics point of view, which may result in longer lifetime. Porcelain coating showed less stress in case of two implants, longer life for the brittle coating material is expected. Contrary more stresses were found on the gold crown placed on two implants due to its volume reduction (less material under the same load). This is clearly seen in increasing stresses on the two implants, that more load effect was transferred through the weak crown to the two implants. That showed maximum stresses in the area under the crown, while the wide implants showed maximum stresses at its tip. Looking to energy absorption and stress concentration on whole system starting from coating to cortical and spongy bone, although the stress levels found was too low and far from cracking danger, the following conclusions can be pointed out. the total results favourise the two implants in spongy bone and the wide implant in the cortical layer, but the alveolar bone consists of spongy bone surrounded by a layer of cortical bone. It’s also well known that according to the degree of bone density the alveolar bone is classified to $D_{1\ldots3}$, in a descending order. So, provided that the edentulous

**Conclusions**

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**Summary**

Restoration of single molar using implants encounters many problems: mesio-distal cantilever due to very wide occlusal table is the most prominent. An increased occlusal force posteriorly worsens the problem and increases failures. To overcome the overload, the use of wide diameter implants or two regular sized implants were suggested. The aim of this study was to verify the best solution that has the best effect on alveolar bone under distributed vertical loading.

Therefore, a virtual experiment using Finite Element Analysis was done using ANSYS version 9. A simplified simulation of spongy and cortical bones of the jaw as two co-axial cylinders was utilized. Full detailed with high accuracy simulation for implant, crown, and coating was implemented. The comparison included different types of stresses and deformations of both wide implant and two regular implants under the same boundary conditions and load application.

The three main stresses compressive, tensile, shear and the equivalent stresses in addition to the vertical deformity and the total deformities were considered in the comparison between the two models. The results were obtained as percentages using the wide implant as a reference. The spongy bone showed about 5% less stresses in the two implants model than the one wide diameter implant. The exceptions are the relatively increase in maximum compressive stresses and deformations of order 12 % and 0.3 % respectively.

The stresses and displacements on the cortical bone are higher in the two implant model due to having two close holes, which results in weak area in-between. The spongy bone response to the two implants was found to be better considering the stress distribution (energy absorbed by spongy bone). Therefore, it was concluded that, using the wide diameter implant or two average ones as a solution depends on the case primarily. Provided that the available bone width is sufficient mesio-distally and bucco-lingually, the choice will depend on the type of bone. The harder $D_{1\ldots3}$ types having harder bone quality and thicker cortical plates are more convenient to the wide implant choice. The $D_{4\ldots5}$ types consist of more spongy and less cortical bone, are more suitable to the two implant solution.

**Contact Info**

Dr Thierry Lachkar is a dental surgeon (Paris Diderot University) and has been a practitioner for 15 years. He is a general practitioner and he works at a dental surgery in Paris. He has specialist post-graduate training in conservative dentistry and in endodontics. He can be contacted at alafkahar@yahoo.fr. [Page 22] Implant Therapy

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**Figure 9 & 10:** Final result.

**Table 7:**

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**Figure 7:**

-A: Spongiform bone deflection in vertical direction (A) wide implant; (B) two implants.

-B: Spongiform bone deflection in vertical direction (A) wide implant; (B) two implants.

**Figure 8:**

-A: Cortical bone deflection in vertical direction (A) wide implant; (B) two implants.

-B: Cortical bone deflection in vertical direction (A) wide implant; (B) two implants.

**Figure 10:**

-Equation 2 (stress energy).

**Figure 11:**

-Strain energy = area under stress strain curve.
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