First vaccine for treating gum disease

A new vaccine could help to replace traditional periodontal treatment methods. (DTT/Photo Dmitry Naumov)

“Periodontitis is a serious disease and dentists face a major challenge in treating it, because most people will not know they have the disease until it’s too late and the infection has progressed to advanced stages,” says Prof. Eric Reynolds, CEO of the Cooperative Research Centre for Oral Health Science and the Head of the University of Melbourne’s Dental School. “This new approach will provide dentists and patients with a specific treatment.”

Traditional periodontal therapy involves manual scaling and cleaning, and even surgery with instruments or dental lasers in an effort to contain the bacterial infection. Reynold said that their new line of vaccine products will possibly prevent the progression of the disease, rather than managing its symptoms and damaging consequences. Sanofi Pasteur has an option, to an exclusive worldwide licence, to commercialise the intellectual property associated with these products.

Painless plasma jets could soon replace dentist's drill

Scientists, at the University of Melbourne, Australia, have announced that they have partnered with CSL Limited and Sanofi Pasteur, the country’s largest biopharmaceutical companies, to further develop and commercialise a vaccine for the treatment of gum disease. The programme, which has been for ten-years in development, involves bacterial peptides and proteins that trigger the immune response to periodontal inflammation. The vaccine is currently being tested in mouse models and is expected to progress to clinical trials soon, the researchers said.

The new vaccine approach is targeting the ‘ring leader’ of a group of pathogenic bacteria called P. gingivalis that cause periodontitis. According to a US-based consortium for P. gingivalis research, elevated levels of the organism were found in the majority of periodontal lesions, as well as in low levels in healthy sites. In addition, the organism also produces a number of enzymes that have been shown to interact with and degrade host proteins. Although the bacterium can be eliminated through periodontal therapy, it is often found in recurrent infections.

Painful tooth decay could be a thing of the past

A new study, published in the Journal of Biological Chemistry, says that various extracellular calcium-sensing receptor (CaSR) agonists enhance sweet, salty, and umami taste, although they have no taste of their own. These characteristics are known as “kokumi taste” and it often appears in the Japanese cuisine.

The researcher Yuzuru Eto and his colleagues found that calcium and certain calcium channel activators trigger calcium channels located on the tongue, enhancing a specific taste. Further, it was found that glutathione (a common kokumi taste element) has no taste of itself but can enhance the basic taste sensation by interacting with these channels. The researchers believe that their study will pave the way in creation of healthy foods with minimal sugar or salt but, can still elicit strong taste.

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FDI, FOLA, and DTI launch campaign for Haitian dentists

The recent earthquake not only devastated Haiti’s meager health resources, but also most dental practices. In a country where there were only 500 dentists for nine million people before January 12th, the extent of the devastation has affected regular people and dental professionals alike.

The president of the Latin American Dental Federation (FOLA), Dr. Adolfo Rodriguez, launched a campaign after the quake asking companies and dental professionals to donate dental instruments, materials, and equipment. He’s organising the campaign for Haiti with the help of FDI World Dental Federation, and Dental Tribune International.

In addition, Dr. Rodriguez is putting together teams of dental volunteers to travel to Haiti to attend to the dental needs of the population. We also need to show our support for our colleagues in Haiti, most of whom have lost everything,” Rodriguez said. “We need to get them back on their feet by helping them to rebuild their practices.”

Dr. Prophet said, in his email, that “many of our colleagues have lost their practices and we were thinking about how to help them. It’s very good news to know that FOLA, FDI and Dental Tribune are trying to help Haitian dentists.” If dentists know “that help is on the way they can have hope!” Dental Tribune will publicize, in its worldwide print and online editions, the campaign for Haiti.

At a meeting in Panama, Dr. Rodriguez of FOLA received the support of the presidents of Central American Dental Associations, and made an emotional appeal to dental manufacturers to donate much needed supplies. He said, “Colgate has already agreed to donate brushes and toothpaste, and that he intended to meet with KaVo do Brasil in the upcoming CIOPS meeting in Sao Paulo to ask for donations of new and used dental units.”

Some prominent Latin American Dental Professionals from Brazil, Uruguay, and Costa Rica among others have already expressed their interest in participating in dental teams to help the most urgent needs of the Haitian population.

The president of FOLA said, “this tragedy is also an opportunity to build a public health service that includes dental care. We have asked the Pan American Health Organization (PAHO), FDI, all Latin American dental associations, companies, and other institutions for help in putting together teams of dental professionals to travel to Haiti and start working there, and leave in place basic dental treatment centers.”

Dr. Rodri-guez said that this will be a long-term programme that includes rebuilding the dental school at the university, as well as private practices.

The Latin American dental leader said he has also asked for funding from the government of Dominican Republic. Companies and dentists interested in helping Haiti should contact Dr. Rodriguez at arn@codetel.net.do, phone at +809 519-0789.

Dental health meet to raise awareness in public

Dr. Insha Goei
DT India

A dental health awareness program ‘Dental Health Utsav’ for the public was organized in Delhi that registered attendance by about 5000 city folks. This mass outreach gathering was held at the Maulana Azad Institute of Dental Sciences (MAIDS) on 15th of December, 2009, as part of an annual public health initiative to raise awareness on the importance of dental health to stay fit. In addition to providing free health check-up and advice, the organizers conducted events to engage public with lecture sessions, smile competition, and a dental quiz, to get the message across.

This assembly was well attended by representatives of the establishment, including the chief minister, the health minister, and the health secretary of Delhi. Dr. Mahesh verma, head of the MAIDS and chief organiser of this meeting, commented, “the first symptoms of various diseases including diabetes, AIDS, certain cancers, eating disorders, venereal disease, and substance abuse can be traced through one’s oral health.” He further added, “in recent years, dozens of studies have shown that periodontal disease may contribute to cardiovascular disorders, stroke and bacterial lung infection, and thus, maintaining good oral health is important for overall health, and the mouth can serve as a looking glass.”

Expressing her concern at the growing incidence of dental problems in school-going children, the chief minister, Mrs. Sheila Dixit said, “preventing tooth decay in youngsters by intervening early should be initiated at school itself. More than 50% of population is suffering from various dental ailments and most of them are preventable with early education.”

On the occasion, the MAIDS was also entrusted with the task to provide dental emergency services to the athletes and delegates during the 2010 Commonwealth Games, which are to be held in the city in October this year. GB Pant Hospital, a tertiary care facility located in the same campus will offer other emergency services to the participants of this sports meet.

Javier M. de Bison
DT Latin America

PANAMA CITY, Panama: The president of the Haitian Dental Association Dr. Samuel Prophet has told Dental Tribune Latin America that he and several colleagues, he was able to contact in Port-au-Prince were fine after the devastating earthquake in his country. “So far, we only have reports of two missing dentists”, Prophet wrote in an email.

Dr. Prophet said, in his email, that “many of our colleagues have lost their practices and we were thinking about how to help them. It’s very good news to know that FOLA, FDI and Dental Tribune are trying to help Haitian dentists.” If dentists know “that help is on the way they can have hope!” Dental Tribune will publicize, in its worldwide print and online editions, the campaign for Haiti.

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Oral bacteria linked to stillbirth

By Case Western Reserve University School of Dental Medicine

CLEVELAND, OH, USA: Researchers at the Department of Periodontics at Case Western Reserve University School of Dental Medicine reported the first documented link between a mother with pregnancy-associated gum disease and the death of her fetus. The studies findings will be discussed in the February issue of Obstetrics & Gynecology.

Approximately 75 per cent of pregnant women experience gum bleeding due to the hormonal changes during pregnancy. "There is an old wives' tale that you lose a tooth for each baby, and this is due to the underlying changes during pregnancy," said Yiping Han, lead researcher of the study. "But if there is another underlying condition in the background, then you may lose more than a tooth but a baby."

Due to pregnancy-associated gingivitis, Fusobacterium nucleatum, a bacteria commonly found in the mouth, entered the blood and worked its way to the placenta. Han was able to match the bacterium found in the mother’s mouth with the bacterium in the baby’s infected lungs and stomach.

Normally a mother’s immune system takes care of the bacteria in the blood before it reaches the placenta. In this case, the mother had experienced an upper respiratory infection and a low-grade fever just a few days before the stillbirth. The baby died from a septic infection and inflammation caused by the bacteria.

The study underlines the growing importance of good oral health care. In addition to this direct link from the mother to her baby, oral bacteria have been associated with heart disease, diabetes and arthritis.

(Edited by Claudia Salwiczek, DTI)

Museum dispels myth about George Washington’s teeth

By Fred Michmurszhuizen

BOSTON, MA, USA: Did you know that George Washington’s false teeth were not really made of wood? Those who visit the National Museum of Dentistry, located here, can see first president’s famous choppers on display, & they can find out more about his tooth troubles. The story about wooden teeth is a myth.

"Many people are surprised to find out that George Washington never had wooden dentures," said Museum Curator Dr. Scott Swank, in a recent press release. "We think the myth arose since ivory dentures tend to stain like wood after years of eating and drinking."

The National Museum of Dentistry features a gallery devoted to the first president and his tooth troubles. His dentures — which were actually made of ivory — are on display, as well as forceps made to pull his teeth on the Revolutionary War battlefield and examples of presidential portraits that show how tooth loss affected Washington’s appearance.

According to the museum, Washington lost his first tooth when he was 22 years old. Despite the fact that he brushed with tooth powder daily, he would have only one tooth in his mouth by the time he was inaugurated president in 1789. Washington had many illnesses during his life, including smallpox and malaria. Treatments included remedies like mercurous chloride, which is known to destroy the teeth.

His favorite dentist, John Greenwood, would make several sets of dentures for Washington during his lifetime — and none of them would be made from wood, according to the museum. In fact, they were carved from hippopotamus ivory and elephant ivory. Some of the dentures were set in gold and held in place with springs that held the upper and lower teeth together.

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NEW YORK, USA/LEIPZIG, Germany: The US-based manufacturer AMD LASERS has recently launched the PicassoLate to the worldwide dental markets. As first in the industry, this new and improved soft tissue dental laser will be able to use convenient disposable tips or a low-cost strippable fiber for a wide range of applications, the company said in a press release. PicassoLate aims specifically at dental hygienists and dentists who have no or little experiences with dental lasers.

Dentists can use PicassoLate for all kinds of soft tissue surgery, including troughing, gingivectomies, frenectomies, exposing implants/teeth/ortho brackets, and treating aphthous ulcers and herpetic lesions. According to the company, it cuts and coagulates tissue with reduced trauma, bleeding, and necrosis of tissue.

PicassoLate, which is priced at US$2,495, comes with a set-up DVD, online laser certification, accessories and a world power adapter. AMD LASERS offers a two-year warranty on all its products.

Countries in Asia less than average in health care spending

Dr. Sathy Kallur, CEO and Director of clinical operations of India, speaking on the plan said, “Starting from Bangalore, we are planning to set up ten dental clinics in major cities of India like NCR, Hyderabad, Chandigarh, Mumbai, Ahmedabad, Chennai, Kolkata and Pune within next three years.” Dr. Sathy added that this venture will also attract medical tourism in India by offering quality services at leaner costs to overseas patients.

Medical tourism, in India, is estimated to grow 29 per cent by 2009-12 to become a $2.4 billion industry. India Brand Equity Foundation (IBEF) quoted a market research report “Booming Medical Tourism in India” to claim that despite the economic slowdown, medical tourism in India is the fastest growing segment of the tourism industry.

Customized implant abutments: Sirona launches titanium bases

The Sirona TIlbase, shown here with the abutment screw and scan body, is compatible with numerous popular implant systems. (DTI/Photo Sirona)

LEIPZIG, Germany: Asian countries have been found to spend less of their GDP’s for health care than most other countries in Europe and the US. According to a new health care report by the Organisation for Economic Co-operation and Development (OECD) in Paris, only New Zealand provided more money for health care than the average of all observed countries. Japan, Korea and Australia, however, spent less than the OECD average of 8.9 per cent of GDP.

The US currently spends more on health care than any other country—almost two and a half times greater than the OECD average of US$2,984, adjusted for purchasing power parity. Luxembourg, France and Switzerland also spend far more than the OECD average. At the other end of the scale, Turkey and Mexico is less than one-third of the OECD average.

The latest edition of Health at a Glance demonstrates that all the countries observed could do better in providing good quality health care. Key indicators presented in the report provide information on health status and the determinants of health, including the growing rates of child and adult obesity, which are likely to drive higher health spending in the coming decades. Based on new data on access to care, the report demonstrates that all OECD countries provide universal or near-universal coverage for a core set of health services, except the US, Mexico and Turkey.
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Impression-free practice, virtual construction models and articulation on Windows desktops, biogenic occlusal surface design with intelligent software, as well as rapid prototyping, and 5-D printing are just some of the topics increasingly mentioned in lectures and publications dealing with CAD/CAM. Already, ‘conventional’ CAD/CAM technology is in use in dental offices and laboratories, and now the next step in CAD/CAM evolution is anticipated. Only a few years ago, discussion focused on exactness of fit, the reduced costs for dentists and patients, and user-friendliness. The quality of CAD/CAM restorations was viewed with cynicism, and only a few pioneers gave scientific attention to this technology. At present, the situation is quite different. The hesitant & doubtful attitude towards computer-manufactured dental prostheses has been discarded, and an accepted, standard procedure has taken its place. Many companies now invest immense resources in the further development of this technology.

What impelled this rapid change? On the one hand, the value of zirconium dioxide ceramic in particular, which can only be processed with computer-assisted techniques, became evident. This material made all-ceramic fixed partial dentures possible for the first time. Other ceramics, too, exhibited better material properties after automated milling because the blanks used could be industrially manufactured under optimal conditions. On the other hand, the technology companies now invest immense resources in the further development of this technology.

Another important current trend is the chairside manufacture of inlays, onlays, partial crowns, and single crowns. The dentist is this CAD/CAM procedure’s target group. The one-appointment treatment has a time-saving benefit for the patient and eliminates provisional restoration, which additionally minimises the risk of cuspal fracture, enamel-margin chipping, and weakening of the dentine bond. The biogenic formation of occlusal surfaces enables the reconstruction of missing occlusal surfaces for inlays, onlays, and partial crowns according to nature’s designs (Figs. 2, 3).

CAD/CAM and all-ceramics are often mentioned in conjunction with each other, which is understandable given the discussion above, but this doesn’t represent all the options. The enormous potential in milling procedures and, just recently, in the laser sintering of metals is often completely forgotten. The manufacture of metal restorations (e.g., non-precious metals, titanium, or gold alloys) will thus eventually become a domain of CAD/CAM technology.

What does the future of CAD/CAM technology hold? Intra-oral 5-D measuring will at least in part make the impression-free practice possible (Fig. 4). The speed, operation, and precision of the images are being continually improved and the measurement range expanded. Once a 5-D data set of tooth surfaces has been stored, a completely novel form of dental diagnostics can be conducted, by comparing data that were recorded at different time points. Thus, quantitative, 5-D progression control of orthodontic treatment, the analysis of erosion & abrasion, periodontal change, or inter-venitions is possible.

A distinct advantage of computer-assisted procedures over the conventional wax-up technique also lies in the functional and morphological occlusal surface design. Complex algorithms can store an immense amount of basic knowledge about tooth structures and individual genetic contexts. Virtual articulators can simulate any programmable movement, so that considerably more natural laws and limits, as well as individual parameters, can be integrated into the restoration surface than has been possible up to now.

The needs of CAD/CAM technology have propelled basic research to new heights and thus advanced other areas of dentistry. Through cooperative ventures, universities and industry can form a useful symbiosis to promote and shape this exciting development. Until now, CAD/CAM or computer-assisted dentistry has not been a central subject at the universities. But because the technology is relatively new and the performance potential of CAD/CAM technology is tremendous, this is certain to change in the next few years, which in turn will influence the training of dental students and indirectly the treatment possibilities in practices as well, in the interests of our patients.

Fig. 1: Virtual automatic reconstruction: the scanned data of the antagonist, functional movement, adjacent teeth and the preparation can be considered in toto, in order to create a fitting occlusal surface that follows all the rules of dentistry and dental engineering. (DTU/Photo A. Mehl)

Fig. 2: The remaining tooth substance determines the morphology of the occlusal surface in the defect region, largely through, for instance, the position of the cusp tips, the cusp slopes, and the course of fossae. The natural rules governing the biogenic occlusal surface can be found through the analysis of many thousands of occlusal surfaces of natural teeth. (DTU/Photo A. Mehl)—Fig. 3: Using the natural laws thus found, an occlusal surface is calculated that replaces the defect as naturally as possible, by adapting it to the remaining tooth structure. (DTU/Photo A. Mehl)

Fig. 4: In the future, intra-oral camera scanners will enable optical impressions of the entire jaw, thus preparing the way for the impression-free practice. (DTU/Photo A. Mehl)
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Directa presents new solutions for Class II cavity preparations

Daniel Zimmermann

DTI

LEIPZIG, Germany: Placing a matrix band to attain a good contact point and avoiding interproximal overhang after excavation for Class II fillings has always been a time consuming & laborious procedure. Directa has announced to offer a unique and easy solution for this procedure by combining a separating plastic wedge with a stainless steel matrix. The Fendermate is available in regular and narrow width and for left or right application and will be colour coded for better identification.

According to the Swedish company, the combined matrix and wedge are inserted as one piece. A new technology contours and compliments the curvature of the patients tooth and holds its shape without having to use a retentive ring that inhibits access to a cavity. The contact point is created by the dual curvature of FenderMate so that further burnishing will not be necessary.

With the combination of FenderMate and Fender Wedge, Directa also offers a tissue friendly approach for the preparation and filling of Class II cavities.

Rice University to work on oral cancer test

Daniel Zimmermann

DTI

NEW YORK, NY, USA/LEIPZIG, GERMANY: Researchers at the BioScience Research Collaborative at Rice University in Houston in the US have received a US$2 million grant from the US National Institutes of Health for the development of a new test for detecting oral cancer. The test, which utilises latest LED and nano microchip technology, aims to provide an accurate diagnosis in less than 30 minutes and can be performed in the dental office. Additional tests for the detection of cardiovascular diseases and HIV are also in development, the researchers said.

Oral cancer affects about 500,000 people per year worldwide, and most cases are diagnosed in the late stages. If oral cancer is detected early, the prognosis for patients is excellent, with a 5-year survival rate of more than 90 per cent. Unfortunately, the actual 5-year survival rate for oral squamous cell carcinoma is only about 50 per cent, amongst the lowest rates for all major cancers.

“We want to provide an accurate diagnosis for oral cancer using a minimally invasive test that requires no scalpels or off-site lab tests,” said principal investigator Prof. John McDevitt, Rice’s Brown-Wiess Professor of Chemistry and Bioengineering. “The payoff for this could be tremendous because oral cancers today are typically diagnosed much too late in their development.”

According to McDevitt, the test is being developed in collaboration with other scientists from universities in the US and the UK.
Implant aesthetics

Since 1980s, osseointegration with dental implants has become a predictable dental procedure with high success rate of over 97%,1,2 Today making a fixed partial denture after reducing two adjacent teeth is not the treatment of choice, and, instead, a single tooth replacement with an implant-supported crown has become the most frequent indication in implant therapy.3 In the posterior areas of the oral cavity, the most important objective of a single tooth replacement is to allow adequate mastication, while the aesthetic outcome is of lesser concern. In contrast, replacing the anterior teeth in the premaxillary zone—often referred to as the ‘aesthetic zone’—requires a cosmetic finish to patient’s satisfaction. This presents a major challenge for implant clinicians & technicians (Fig 1).

There are major difficulties in placing the implants because of various local risk factors that can compromise the final aesthetic outcome (Table 1).

From our experience, the following criteria are important to prevent loss of hard and soft tissues to achieve optimum aesthetics:

- Implant should be tapered with a progressive thread design, i.e., the implant threads get progressively deeper towards the apical end engaging more bone in the soft spongy area of the apical region. This ensures primary stability even in a compromised bone. However, for implant stabilization, its crestal part should have shallower threads to prevent excessive stress in the dense cortical bone of the region.2,3

- Implant should not have any polished collar and should be surface-treated (roughened) right up to its top. This allows bone to grow right up to the platform of the implant resulting in minimal bone loss due to remodeling (Figs 4 & 5).

- The implant abutment connection should be a conical tapered one to prevent micromovement and microleakage. This will help lead to stability of the peri-implant hard and soft tissue.

- Implantation should be delayed, if the tooth to be extracted is infected and loss of the labial plate of bone is expected. After waiting for 5 weeks for the soft tissue closure, implant can be placed with guided bone regeneration along with a modified Maryland bridge (Fig 6a-f).

To better explain the concepts for achieving optimum aesthetics, we are providing two case reports.

Case report 1

A male, aged 62 years, reported with a fractured central incisor and requested to be rehabiliated urgently with a fixed restoration. It was decided to do an immediate implantation with a fixed provisional restoration on a final abutment. The ‘ANKYLOS’ implant system was selected for using in this patient due to its numerous advantages in immediate implantation and provisionalisation.

The tooth was extracted atraumatically as described earlier. After preparation of the osteotomy as per the protocol of ‘ANKYLOS’, a 4.5 mm diameter and 14 mm long implant was motor driven into place (Fig 7a). The final ratcheting was done by hand to place the implant 5 mm away from the free gingival margin (Fig 7b). We achieved good primary stability in the region of 55 Nm and therefore we removed the cover screw and placed the final ‘ANKYLOS’ abutment. Abutment with a 5 mm diameter it only by hand pressure. The conical-tapered connection of the ‘ANKYLOS’ system can be friction-locked with very little torque. An alginate impression was taken of the abutment and a crown was fabricated on the prepared cast using the unique shading system of the composite Ceram-X (Dentsply) to match the color of the adjacent lateral incisor (Fig 7c). After a period of 4 weeks to allow heal-

**Table 1. Hindrance in placing implants in the premaxillary zone**

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<th>Hindrance</th>
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<td>High incidence of missing labial plate of bone</td>
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<td>High potential loss of interdental papillae leading to black triangles</td>
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<td>Less than optimal bone quality</td>
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Fig. 1. Although this implant is surviving and is functional to the patient, aesthetically it is not a success due to the labial placement of the implant.

Fig. 2a, b & c: Atraumatic extraction of the tooth starting with microsurgical no 15 blade followed by periodontal curettes and finally a thin luxator in Fig 2c. The periodontal curettes should apply pressure on the mesio-distal surfaces and the palatal surfaces only. The microsurgical blade may be used to remove the periodontal ligament fibers on the labial aspect.

Fig. 3: Correct labio-palatal placement of the implant in the extraction socket with space of about 2-mm on the labial aspect, which may be grafted with particulate synthetic bone like Algipore (Dentsply, Friadent, Germany).

Fig. 4: Shows the unique ‘ANKYLOS’ implant (Dentsply Friadent, Germany) with progressive thread design and conical tapered connection.

Fig. 5: Although the implant is placed sub-cortically, observe the excellent preservation of crestal bone. Implant in service since last 2 years.

Fig. 6a: Healing of soft tissue after three weeks of extraction.

Fig. 6b: Buccal defect on labial aspect after the removal of cover screw and placement of sulcus former.

Fig. 6c: Grafting of the defect with micro-vascularized red allograft (Sklapore, Dentsply, Friadent).

Fig. 6d: Covering of grafted bone with absorbable collagen membrane (BioGide, Geistlich, Switzerland).

Fig. 6e: Excellent primary closure achieved due to waiting for three weeks after extraction.

Fig. 6f: Orthopantomograph of the ‘ANKYLOS’ implant with sulcus former in place to further support the soft tissue.
After placement of the implant and waiting for 6 months for the hard and, more importantly, the soft tissue to stabilize, an implant-level transfer impression was taken. The technician with the aid of a soft tissue model very accurately prepared the abutment in the laboratory. It was then transferred with the aid of a resin transfer jig to the patient’s oral cavity (Fig 8a). The final PFM is cemented.

Note the exact duplication of color, anatomy and texture of the adjacent central incisor due to the excellent laboratory support (Fig 8b).

References


New Colgate® Sensitive Pro-Relief™ desensitizing paste with Pro-Argin™ is **clinically proven to provide instant and lasting sensitivity relief after just one application.**

Colgate® Sensitive Pro-Relief™ with Pro-Argin™ Technology is a breakthrough treatment for patients with dentin hypersensitivity. It can be used before or after dental procedures such as prophylaxis and scaling.

- Significantly reduces sensitivity for an easy, comfortable procedure
- Fast and easy application using a rotary cup, similar to a prophesy paste
- Clinically proven to deliver instant relief that lasts four weeks after a single application

* Graphical representation based on SEM photography; for illustration only
Dentin Hypersensitivity is a Chronic Problem for Patients

Hypersensitivity can affect normal daily activities such as eating, drinking, breathing in cold weather and tooth brushing which may lead to poor oral hygiene, eventually leading to periodontal problems and even tooth loss.

Dentin hypersensitivity is characterized by short, sharp pain arising from exposed dentin in response to stimuli, such as cold, hot, sour or sweet food and drinks, air (cold weather) or pressure, which cannot be ascribed to any other dental defect or disease. "The major portion of the hypersensitivity sufferers are in the age group of 20 - 49 years and females are more likely to be affected than males." There is also variation in the response to such stimuli from one person to another.

The primary causes of hypersensitivity are gingival recession and loss of enamel. Gingival recession can occur as a result of incorrect tooth brushing, aging, periodontal diseases and surgical periodontal treatment which leads the gums to move away from their normal position. When the root of the tooth is exposed through gingival recession, the protective layer of cementum on the dentin can easily be removed and the dentin layer becomes exposed. Also, enamel loss as a result of aggressive tooth brushing, over consumption of acidic food and tooth grinding caused by stress can expose dentin. The dentin layer contains thousands of small tubules starting from the enamel and ending at the nerve of the tooth. When dentin is exposed, stimuli cause changes in fluid flow through the tubules and this causes pain.

The choices to relieve dentin hypersensitivity by dentists are limited so many dentists recommend home use toothpastes with potassium salts, to desensitize the nerves which typically need 4-8 weeks to be significantly effective and do not treat the cause of hypersensitivity.

Reference: 1. Oral Care habits Study by TNS Mar Aug 2009
"The new breakthrough Pro-Argin™ technology is clinically proven to provide instant and lasting hypersensitivity relief." Pro-Argin™ technology consists of 8% arginine (an amino acid naturally found in saliva) and an insoluble calcium compound. It plugs and seals the dentin tubules and thus provides hypersensitivity relief. The innovative Pro-Argin™ technology is introduced as two products: Colgate® Sensitive Pro-Relief™ Desensitizing Paste for dental office use to provide instant sensitivity relief that lasts for four weeks after a single application, and it can be used before or after dental procedures, such as professional cleaning; and the new Colgate® Sensitive Pro-Relief™ toothpaste containing 1450 ppm fluoride developed for routine daily use.

The new Pro-Argin™ technology helps patients with hypersensitivity to get instant and lasting sensitivity relief for a problem that they’ve had to live with for a long time.
**Instant & lasting sensitivity relief with breakthrough Pro-Argin™ Technology**

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**Colgate® Sensitive Pro-Relief™ with Pro-Argin™ Technology is the first toothpaste that is clinically proven to provide instant & lasting sensitivity relief**:  

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- Clinical studies demonstrated significantly greater sensitivity reduction with twice daily brushing compared to control toothpaste with potassium ions\(^4\)
- 1450 ppm fluoride for caries prevention
- Contains the Pro-Argin™ Technology as in the Colgate® Sensitive Pro-Relief™ Desensitizing Paste

**Colgate® Sensitive Pro-Relief™ Toothpaste**  
for the daily oral care of sensitive teeth

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A clear, fixed pressure-formed, habit breaking appliance

Digit sucking habit, usually referred to as thumb or finger sucking habit, can cause adverse effect on normal pattern and direction of the skeletal and dentoalveolar growth. During thumb sucking, due to lowered position of the tongue in the oral cavity, maxilla tends to grow in an abnormal protrusive direction with the mandible growing in downward and backward direction. It causes maxillary anterior teeth protrusion while mandibular teeth are retroclined. The lowered position of tongue as well as the increased cheek pressure may also result in posterior cross bite.

Moyers has concluded, that the thumb sucking habit creates undue pressure on immature highly malleable alveolar ridge, and can lead to malposition of the teeth, aberrant breathing pattern, speech abnormalities, facial muscular abnormalities, and psychological problems.

Grabner, in his classic work, states that the muscle activity is normal in Class I malocclusion except in case of Class I malocclusion with the anterior open bite. The most common cause of anterior open-bite problems is thumb or finger sucking habit. It is considered normal for children to engage in non-nutritive sucking during infancy which mostly disappears spontaneously by 6-18 months of age.

Profit states that most of the dental changes resolve if sucking habit is discontinued before eruption of the permanent teeth erupt. In cases of persistent thumb sucking habit with sufficient intensity, frequency and duration, maxillary anterior segment is deformed leading to adaptive forward thrust of tongue, which accentuates open bite, preventing adequate eruption of maxillary incisors and forcing them labially. When maxillary incisors move labially, lip entries in to picture and joins the tongue in nature’s adaptive attempt to create oral seal during swallowing. Open bite is accentuated by this vicious cycle unless normal activity is restored and mature somatic pattern is achieved (Fig. 1).

Habitting appliances make thumb sucking meaningless by breaking suction, preventing displacement of incisors and reposition the tongue. Habit breaking appliances, generally, have an associated problem of compliance wear, especially with the commonly used removable crib with little success.

Haskell and Mink introduced Blue-grass appliance having hexagonal tension roller on the cross-palatal bar. Chris Baker modified Blue-grass appliance by replacing roller with two acrylic beads claiming more stimulation of tongue. All these modifications required some wire bending skills, with soldering procedures in some designs for cross-palatal bar-bearing crib, spikes, beads or rollers, but without any passive guidance elements for labially deflected or erupted incisors.

This article introduces a new clear, fixed pressure-formed habit breaking appliance, which is easy to fabricate and is clear, for early patient acceptance, & overcomes non-compliance associated with removable appliances with passive eruption guidance to incisors.

Appliance design and fabrication
1. Patient’s molar bands with soldered buccal and lingual buttons, on a working cast (Fig. 2). Button soldered to provide retention of molar bands into pressure-formed sheet.
2. The cast was scored with three deep bur holes along the line joining cuspid tips on the rugae area (Fig. 5).
3. Orthodontic white stone was used to create spikes with stone flowing and anchoring into retention holes on cast (Fig. 4).
4. Wax relief was given along erupting incisor path (Fig. 5).
5. Working model in Ministar R unit & Durafil pressurising moulding foil were used to form the appliance (Fig. 6).
6. Labial view of the appliance (Fig. 7).
7. Inside view of the appliance with sheet cut out over molar band’s occlusal surface, ready to be cemented in patients mouth (Fig. 8).
8. The spikes of pressure formed appliance can be filled with wax, cement, or colored acrylic to provide additional rigidity.
9. Wax relief over erupting incisors can progressively be removed (Fig. 9).

To provide guidance, the appliance can be cut back on lingual aspect of incisors, with a floppy composite flown into labial, for applying pressure on erupting incisors to be guided lingually.

Discussion
Grabner mentioned fashion flourish in orthodontics as they do in interior decorating and clothes designing, with time-linked subject orientation. Current popularity of pressure-formed appliances, after Sheridan’s thermo-formed appliances for corrective orthodontics and retention purposes, have encouraged development of appliances which are easy to fabricate with no wire parts, and are less costly. Clear and transparent appearance of these appliances promotes early patient acceptance especially in the prepubertal children with low ego strength.

The thumb sucking habit, leading to open bite malocclusion is, generally, the first assault on the integrity of dentition and the adaptive and compensatory activities of tongue and lip, which later may team up to provide a more significant deforming mechanism. Thus, it is essential that an interceptive appliance is provided to eliminate thumb sucking habit before arch is deformed sufficiently, to require homoeostatic muscle action during deglutition.

This, new pressure-formed fixed clear appliance, helps in eliminating deleterious thumb sucking habit with passive guidance to incisors in eruption, allowing correction of the open bite, especially in noncompliant patients.

References available on request.

About the author

Dr. Deepak Rai is a associate professor in the department of orthodontics at Sudha Rastogi College of Dental Sciences and Research, Faridabad, India.

Co-author
Dr. Gurkeerat Singh is a professor in the department of orthodontics at Sudha Rastogi College of Dental Sciences and Research, Faridabad, India.
Minimally invasive cosmetic dentistry

A concept and treatment protocol for general practice

Dr. Sushil Koirala
Nepal

Increased media coverage and the availability of free web-based information has lead to heightened public awareness and thus to a dramatic increase in patients’ aesthetic expectations, desires and demands. Today, a glowing, healthy and vibrant smile is no longer the exclusive domain of the rich and famous and most general practitioners are forced to incorporate various aesthetic treatment modalities in their daily practices to meet this growing demand.

The treatment modalities of any health-care service are aimed at the establishment of health and the conservation of the human body with its natural function and aesthetics. The concept of minimally invasive (MI) treatment was initially introduced in the medical field and was adopted in dentistry in the early 1970s with the application of diamine silver fluoride. This was followed by the development of preventive resin restorations (PPR) in the 1980s and the atraumatic restorative treatment (ART) approach and Carisolv in the 1990s. The major components of MI dentistry are the risk assessment of the disease with a focus on early detection and prevention; external and internal remineralisation; use of a range of restorations, bio-compatible dental materials and equipment; and surgical intervention only when required and only after any existing disease has been controlled. Thus far, the focus of MI dentistry has been on caries-related topics and has not been comprehensively adopted in other fields of dentistry. Dr. Miles Markley, one of the great leaders of preventive dentistry, advocated that the loss of even a part of a human tooth should be considered a serious injury & that dentistry’s goal should be to preserve healthy and natural tooth structure. His words are much more relevant in today’s cosmetic dental practice, in which the demand for cosmetic procedures is rapidly increasing. With the treatment approach trend towards the more invasive protocols, millions of healthy teeth are aggressively prepared each year in the name of smile makeovers and instant orthodontics, neglecting the long-term health, function and aesthetics of the oral tissues.

The need for a new concept

Contemporary aesthetic dentistry demands well-considered concepts and TP’s that provide a simple, comprehensive, patient-friendly and MI approach with an emphasis on psychology, health, function and aesthetics (PHFA; Fig. 1). The need for a holistic concept and basic treatment guidelines was expressed by concerned practitioners, aesthetic dentistry associations and academics around the world for the following basic reasons:

- Owing to an increased aesthetic demand, aesthetic dentistry is becoming an integral part of general dentistry. The aesthetic outcome of any dental treatment plays a vital role in the patient’s treatment satisfaction.
- MI dentistry currently focuses on prevention, remineralization and minimal dental intervention in the management of dental carious lesions. It has failed to give the necessary attention to the problems that negatively affect smile aesthetics, for example non-carious dental lesions, or developmental defects and malocclusion.

- The treatment modalities of contemporary cosmetic dentistry are trending towards more invasive procedures with an over-utilisation of crowns, bridges, thick full veneers, and invasive periodontal aesthetic surgeries, while neglecting long-term oral health, actual aesthetic needs and the characteristics of the patient.

- Social trust in dentistry is degrading, owing to the trend of fulfilling the cosmetic demands of patients without ethical consideration and sufficient scientific background (the more you replace, the more you earn; more is more mentality).

In this article, I introduce a concept and TF for minimally invasive cosmetic dentistry (MI CD), in order to address these facts pr o p e r l y and integrate the evidence-based MI philosophy and its application into aesthetic dentistry.

Defining MIDC

As the perception of aesthetics and beauty is extremely subjective and largely influenced by personal beliefs, trends, fashion, and influence from the media, a universally applicable definition is not available. Hence, smile aesthetics is a multifactorial issue that needs
To be adequately addressed during aesthetic treatment,17 MİCD deals both with subjective and objective issues. Therefore, in this article I define MİCD as “a holistic approach that explores the smile defects and aesthetic desires of a patient at an early stage and treats them using the least intervention options in diagnosis and treatment technology by considering the psychology, health, function and aesthetics of the patient.” The core MİCD principles are:

1. application of the sooner-the-better approach and exploration of the patient's smile defects and aesthetic desires at an early stage in order to minimise invasive treatments in the future;
2. smile design in consideration of the psychology, health, function and aesthetics (Smile Design Wheel19) of the patient;
3. adoption of the do-no-harm strategy in the selection of treatment procedures and the maximum possible preservation of healthy oral tissues;
4. selection of dental materials and equipment that support MI treatment options in an evidence-based approach;
5. encouragement of the keep-in-touch relationship with the patient to facilitate regular maintenance, timely repair and strict evaluation of the aesthetic work performed.

The main MİCD benefits include:

1. promotion of health, function and aesthetics of the oral tissues and positive impact on the quality of life of the patient;
2. preservation of sound tooth structures (banking the tooth structure), while achieving the desired aesthetic result;
3. reduction of treatment fear and increased patient confidence;
4. promotion of trust and enhancement of professional image.

The MİCD treatment protocol

In my experience, the TP’s that are currently in use in aesthetic dentistry are mostly based on more invasive techniques and procedures. With the use of such protocols, cosmetic dentists are knowingly, or unknowingly, heading towards the over-utilisation of invasive technologies in their practices, which is becoming a professional and ethical concern. The basic aim of the MİCD TP is to guide practitioners in achieving optimum results with as little intervention as possible. The introduction level of the treatment in MİCD depends on the type of smile defects and the aesthetic needs (subjective measurement and subjective perception) of the patient.

The basic framework and pathway of the MİCD TP are illustrated in Figures 2 and 3. It is to be noted that the TP in medical and dental sciences must be dynamic in nature and should be flexible to incorporate evidence-based facts. I have therefore outlined the MİCD core principles that are required to achieve the optimum result in terms of health, function and aesthetics with minimum intervention and optimal patient satisfaction. However, it is the practitioner’s duty to incorporate all the necessary guidelines, protocols and regulations of the authority concerned (state or affiliated professional organisations) into the MİCD TP.

Phase I: Understand

In the first step of Phase I, the perception, lifestyle, personality, and desires of the patient are explored. The primary goal of this first step is a better patient-dentist understanding. As the aesthetic perceptions of the dentist and the patient may differ, it is imperative to understand the subjective aesthetic perception of the patient. Various types of questions, personal interviews and visual aids can be used as supporting tools. In this step, the practitioner should ask the patient to complete the MİCD self smile-evaluation form. The information obtained will help estimate the perceived smile aesthetic score (a-score) and will be used as the base-line data in the evaluation step.

Next, diseases, force elements and aesthetic defects of smile are explored. Information on the medical and dental history, general health and specific health (oral-facial) of the patient is collected and complete dental and periodontal charting is performed. In order to understand the force elements, the existing occlusion, comfort, muscular activity, speech and phonetics are thoroughly examined with the evaluation of para-functional and other oral habits, comfort during mastication and deglutition, and temporomandibular joints (TMJ) movements. The necessary diagnostic tests, photographic documentation and the diagnostic study models are prepared during this step for the further exploration of existing diseases, force elements and aesthetic defects.

In the following step, the data collected is analysed in relation to the accepted normal values of a patient’s sex, race and age (SBA) factors. The aesthetic components of the smile are analysed in detail grouped into macro-(facial and dental midline relation, facial profile, symmetry of the facial thirds and hemi-faces), mini- (visibility of upper anterior teeth, smile arc, smile symmetry, buccal corridor, display zone, smile index and lip line) and micro-aesthetics (dental: central dominance, teeth proportion, axial inclination, incisal embrasure, contact-point progression, smile line, gingival: height, shape, contour, embrasure and zenith height). The practitioner can now grade the smile in terms of the patient’s health, function and aesthetics as follows:

- Grade A: The established parameters of oral health, function and aesthetics are within normal limits and aesthetic enhancement is required only to fulfill the patient’s cosmetic desires.
- Grade B: The established parameters of oral health and function are within normal limits, however, the aesthetic parameters are below the accepted level. Aesthetic enhancement can further improve the aesthetic parameters.
- Grade C: The established parameters of oral health or function or both are below the normal limits. An establishment treatment is mandatory prior to aesthetic enhancement.

From the above, the practitioner will obtain a smile aesthetic grading in terms of the patient’s health, function and aesthetics, as well as a complete overview over the smile aesthetic problems and the macro-, mini- and micro-smile defects. The patient’s PHFA factors are the four fundamental components of aesthetic dentistry and must be respected to achieve healthy, harmonious and beautiful smiles. The design step depends on the information obtained from exploration and analysis. The information on psychology is subjective in nature; however, health, function and aesthetic analysis provides the objective information that will guide the design with the various established and basic principles of smile aesthetics and also the feasible & practical extent of the aesthetic desires of the patient. The aesthetic mock-up, manual tracing, digital makeover and smile catalogues are some of the popular tools used in this step. A new smile, alternative designs, types of treatments involved, complexity, possible risk factors and complications, treatment limitation, and tentative costs should be established during this step.

For easy application, the aesthetic treatments in MİCD are categorised as follows:

- Type I: Micro-aesthetic components;
- Type II: Mini-aesthetic components; and
- Type III: Macro-aesthetic components: facial and dental midline relation, facial profile, symmetry of facial thirds and hemi-faces.

As the treatment modality depends on the professional capability and experience of the practitioner, simple and practical methods are used to categorise the MİCD treatment complexity:

- Grade I: Treatment that may require consultation with a specialist (preventive, simple oral surgery/endodontics/periodontics/implants, short orthodontics);
- Grade II: Treatment that requires the procedural involvement of other dental specialists (complex endodontics/periodontics/orthodontics) but not oral and maxillofacial surgery or plastic surgery; and
- Grade III: Treatment that requires the procedural involvement of oral and maxillofacial surgery or plastic surgery.

With the aid of this simple grading system, any practitioner can determine the complexity of the treatment involved for the accomplishment of a new smile design for an individual patient and can plan for the necessary multidisciplinary support.

The last step of this phase is the most important in MİCD TP because in this step the patient is presented with an image of his or her future smile. Visual aids, such as a smile catalogue, aesthetic mock-ups, manual
sketches, modified digital pictures, computer-designed make overs or animations can be used as presentation tools. The results of the design step are systematically presented to the patient with professional honesty and ethics. All pertinent queries of the patient related to the proposed smile need to be addressed during presentation. The treatment complexity, its limitations, the risks involved, possible complications, treatment cost estimation and maintenance responsibility must properly be explained to the patient. The patient is thus involved in finalising the treatment plan and will sign the written informed consent form before proceeding to Phase II.

Phase II: Achieve

As per the TP, which is finalised during the presentation step, all necessary preventive interceptive and restorative (curative) dental treatments are conducted in order to establish the proper health and function of the oral tissues. Owing to the complexity of the treatment, a multidisciplinary approach may be necessary for a good result. Once the case is stable in terms of health (controlled disease) and function (balanced force elements) with good oral habits, the patient is requested to re-evaluate his or her smile in terms of aesthetics with the help of the MICD self smile re-evaluation form. This is important, because in some cases the patient is fully satisfied with the results of the establishment step alone and may modify his or her idea of further aesthetic enhancement. In MICD TP it is considered unethical should the practitioner not collect self smile re-evaluation information from the patient.

The enhancement step of MICD is focused on the fulfilment of the patient’s aesthetic desires, which can be grouped into two categories based on the patient’s needs and wants. Even though it is sometimes difficult to draw a clear line between the two & their related treatment, in MICD they are categorised as follows:

- needs: objective restorative needs of the patient in harmony with the SRA factors and due emphasis on health and function of oral tissues (natro-mimetic smile enhancement).
- wants: subjective desires of the patient, which may not be in harmony with the SRA factors (cosmetic smile enhancement).

Evaluation is the final step of MICD. The ‘completed’ treatment without a proper evaluation is considered incomplete in MICD protocol. The following components need to be evaluated:

- Global patient satisfaction: After receiving aesthetic dental treatment, the patient is requested to complete the MICDexit form, in which the patient evaluates his or her new smile, gives a second perceived smile aesthetic score (b-score), and indicates his or her global satisfaction score. The b-score is compared with the previous a-score. This process helps determine the patient’s actual satisfaction status. In MICD, this is the main parameter for evaluating a patient’s aesthetic satisfaction.
- Clinical success: Clinical success is a multifactorial issue. Selection of proper cases (the patient), restorative materials, TPs and their correct and skilful application are the key factors for clinical success. Therefore, MICD TP suggests self-evaluation of the following four factors (4Ps) using the MICD clinical evaluation form:
  - Patient factors: regular maintenance-status, compliance issues and attitude of the patient towards aesthetic treatment;
  - Product factors: bio-compatability, mechanical and aesthetic quality of the products used for the reconstruction and the functional status of these products;
  - Protocol factors: TP used in terms of its simplicity, predictability & its evidence-based nature;
  - Professional factors: existing knowledge and skills, and attitude towards developing these.

Detailed clinical documentation of the case during maintenance and evaluation can provide various cues to the practitioner in the evaluation of his or her clinical success in terms of case planning, material and protocol selection, as well as his or her existing restorative skills. I believe that a thorough evaluation can support any practitioner in initiating practice-based research and keeping up-to-date with the recent trend of evidence-based dentistry (Figs. 4a–5b).

MICD treatment modalities

Various types of treatment modalities are available in MICD. Their effective use depends on the level of smile defects, type of smile design, proposed treatment type and the treatment complexity grade. There is only one principle in selecting treatment modalities in MICD: always select the least invasive procedure as the choice of the treatment.

The two categories of MICD treatment are NI and MI treatment (Table 1). However, conventional invasive treatment modalities may also be required, depending on the complexity of the case.

Conclusion

MI dentistry was developed over a decade ago by restorative experts and found on sound evidence-based principles. In dentistry, it has focused mainly on prevention, re-mineralisation and minimal dental intervention in caries management and not given sufficient attention to other oral health problems. I believe that the MI philosophy should be the mantra adopted comprehensively in every field of the dentistry. For this reason, I have explained the MICD concept and its TP, which integrates the evidence-based MI philosophy into aesthetic dentistry, in the hope that it will help practitioners achieve optimum results in terms of health, function and aesthetics with minimum treatment intervention and optimum patient satisfaction.

Acknowledgements

In formulating the MICD TP, I discussed the concept with several national and international colleagues in order to ensure that it is simple, practical and comprehensive. I would like to extend my gratitude to Dr Akira Senda (Japan), Dr Didier Dietschi (Switzerland), Dr Hisashi Hisamitsu (Japan), Dr Oliver Henneberg (Singapore), Dr Dinos Kountouras (Greece), Dr Mahi L. Singh (USA), Dr Ryuichi Kondo (Japan), Dr So-Ran Kwon (Korea), Dr Prafulla Thumati (India), Dr Vijayarathnam Vijayakumaran (Sri Lanka), as well as Dr Suhil R. Adhikari, Dr Rabindra Man Shreshtha, Dr Binod Acharya and Dr Dinesh Bhusal of Nepal, for their valuable comments, advice and feedback.

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Dr. Sushil Kevala is the founder and president of the Vedic Institute of Smile Aesthetics and maintains a private practice focusing primarily on MI cosmetic dentistry (MICD). He can be contacted at skevala@Histlink.com au.
“Allergic reactions from amalgam fillings in some patients have been acknowledged”

An interview with Prof. Lars Hylander, Uppsala University

In November, 2009, an agreement in concept was reached by a World Health Organization-convened international expert group meeting, supporting the phase-out of dental mercury use worldwide.

Dental Tribune Group Editor Daniel Zimmermann spoke with Prof. Lars Hylander, Associate Professor at the University of Uppsala in Sweden who attended the meeting, about the agreement and strategies for future biomaterials use in dentistry.

Daniel Zimmermann: Prof. Hylander, you recently attended a joint meeting of the World Health Organization (WHO) and the United Nations Environment Programme (UNEP) that aimed to assess the latest clinical evidence on dental restorative materials. Could you tell us about the outcome of the meeting?

Prof. Lars Hylander: Most participants agreed that amalgam should be phased out or at least phased down. Dr Poul Erik Petersen, Responsible Officer for Oral Health at the WHO, however, raised several good questions, such as what to tell people in poor countries who cannot even afford dental amalgam fillings. At this point, the room grew rather silent.

A similar consultation was held more than ten years ago. What has changed since then concerning the manner in which dental restorative materials are perceived?

Allergic reactions from amalgam fillings in some patients have been acknowledged by pro-amalgamists. Mercury leakages and emissions from dental amalgam into the environment have been fully acknowledged, particularly after dental amalgam was banned in Norway and Sweden, and restricted in Denmark and other places. Proof of methylmercury formation in wastewater from dental clinics is a third factor that makes the continued use of amalgam less justified. Another factor is that alternative tooth filling materials are now available or in development.

What has been decided regarding dental amalgam?

The WHO has not been as quick as Norway, who instituted a ban on dental amalgam in less than six months after the proposal of a ban was presented in the country. Thus far, nothing has been decided, but the WHO can hardly ignore the decision made by the world’s governments within the UNEP to negotiate a mercury treaty, which will begin in Stockholm next June. There was some consensus that mercury use in dentistry should be phased down. A suitable way to do this is to begin teaching alternative restoration techniques, other than dental amalgam, in dental schools.

There was a focus on the oral cavity, which thus ignored the environmental aspects such as mercury emissions from crematoria and leakage of mercury into wastewater from dental clinics and the wearing of amalgam surfaces due to everyday chewing. The American Dental Association demonstrated this most clearly in

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DT
Implants displaced into the maxillary sinus

By Dov M. Almog, DDS, Kenneth Cheng, DDS & Mohammad Rabah, DDS

As some have predicted,1 the growth in dental implant-based procedures increased considerably in recent years. As a result, there has been a rapid increase in the number of practitioners involved in implant placement, including specialists and generalists, with different levels of expertise. At the same time, although at a low frequency, we are witnessing a diversity of unusual complications associated with these procedures, some of which are displaced implants into the maxillary sinus.

A literature search revealed several published reports of displaced foreign bodies into the maxillary sinus.2–6 Generally speaking, foreign bodies in the maxillary sinus include multiple displaced objects. These include teeth, roots, impression materials, dental instruments, broken burs and, more recently, dental implants. Although foreign bodies in the maxillary sinus are not common, it behooves us to familiarize ourselves with such an unusual complication and its management. Displacement of such foreign bodies into the maxillary sinus occurs following dental procedures that create an unplanned oroantral perforation. The procedure associated with the removal of foreign bodies from the maxillary sinuses is considered very invasive. In this case report, the authors describe a systematic approach to the removal of two implants displaced into the right and left maxillary sinuses.

Currently, there are two accepted methods for removing foreign bodies displaced into the maxillary sinus. One method is the endoscopic transnasal maxillary sinus surgery.7,8 Access to the maxillary sinus is achieved through the nose via the ostium. The foreign body is captured and removed using an ultrasonic retrieval basket through the endoscopic working channel port. The advent of endoscopic techniques has made it the preferable choice, especially for patients with chronic sinusitis.

The most commonly used technique for retrieval of foreign bodies displaced into the maxillary sinus is the Caldwell-Luc procedure. In contrast to the endoscopic technique, which involves accessing the maxillary sinus via the nose, the Caldwell-Luc procedure involves gaining access to the maxillary sinus by the fenestration of the anterior lateral wall of the maxillary sinus or canine fossa.9,10

The Caldwell-Luc procedure offers better direct visual access to the maxillary sinus as compared to the endoscopic approach, but is considered more aggressive with potentially more serious complications. Some of the possible complications are dysesthesia of the infraorbital nerve, numbness of the maxillary tooth, injury to the floor of the orbit and facial edema. This older and perhaps less conservative technique for accessing the maxillary sinus was first introduced by two otolaryngologists (American and French) in 1893.9,10

Case report

A 50-year-old African-American male Vietnam veteran presented to the VA New Jersey Health Care System Dental Service at East Orange seeking dental care. A comprehensive oral and maxillo-facial examination included an intraoral and extraoral exam, including cancer screening, full-mouth X-rays, and a cone-beam CT (i-CATTM 3D CBCT Imaging Sciences International, Hatfield, Pa.), revealing, among other things, two implants displaced into the right and left maxillary sinuses.

Ultimately, the exam revealed a diversity of oral and maxillofacial problems, such as retained roots, decay and missing teeth, to name a few.

Which restorative materials were considered to have the most potential for use in developed and developing countries?

Composites and other white filling materials have replaced amalgam in several developed nations. Even in countries without any ban, such as in Japan, less than four per cent of the fillings are now fabricated with amalgam, for aesthetic reasons. In addition, many patients do not find it sensible to have as toxic an element as mercury just a few centimetres from their brains.

However, the chief complaint noted by the patient, and most profound clinical finding, was “two implants displaced into the right and left maxillary sinuses” (Figs. 1–5). The medical history was non-contributory.

Proceeding with careful assessment of all the available diagnostic information, and upon further discussion with the patient, several treatment options were developed in association with his retained roots, carry and missing teeth. As far as the patient’s chief complaint, one treatment option was offered to him, that is, the Caldwell-Luc procedure to remove both displaced implants in his maxillary sinuses. After careful consideration, the patient chose to proceed with the proposed treatment plan.

A Caldwell-Luc procedure was performed under general anaesthesia. Specifically, the Caldwell-Luc procedure involved making an incision in the buccal-gingival sulcus in the area of the maxillary canine and bicuspids teeth, exposing the anterior lateral wall of the maxilla. Care was taken to avoid injury to the infraorbital nerve as it exits in the infraorbital foramen. Using a bar and Kerisson’s rongeurs, a window was made through the anterior lateral wall of the maxilla, thereby gaining access to the maxillary sinus.

The sinus were then irrigated and packed with iodoform gauze, which was later removed. The incision was closed. Post-operatively, the patient did well and no complications were reported.

Conclusions

As described in this case report, the clinical management associated with the removal of dental implants displaced into the maxillary sinuses is considered very invasive. While numerous dental reports described patients treated for displaced implants into the maxillary sinuses, none illustrated those from a preventive standpoint, that is, the use of CBCT-based dental imaging before placing dental implants.

While the quantitative relationship between successful outcomes in dental implant treatment and CBCT-based dental imaging is unknown and awaits discovery through large prospective clinical trials, the authors strongly believe that using CBCT-based dental imaging is becoming a reliable procedure from a precautionary standpoint based on a series of recent preliminary clinical studies and case reports.

References available on request.

About the authors

Dov M. Almog, DDS, Chief of the Dental Service, VA New Jersey Health Care System (VANJHCS)
Kenneth Cheng, DDS, Oral and Maxillofacial Surgery, VANJHCS
Mohammad Rabah, DDS, Oral and Maxillofacial Surgery Resident, VANJHCS

For reprint: Dov M. Almog, Chief Dental Service (160) VA New Jersey Health Care System 385 Tremont Avenue East Orange, N.J. 07018 Tel: (973) 467-1000, ext. 1254 Fax: (973) 595-7919 E-mail: Dov.Almog@va.gov

Thank you very much for the interview.

Fig. 2: Axial slice is useful for revealing the two displaced implants from a different angle.

Fig. 3: Three-dimensional virtual rendering (3-D VR) of the displaced implants provides the surgeon feedback as to the surgical approach. In this case, a Caldwell-Luc procedure was performed using a bar to create an access window through the lateral wall of the maxilla, thereby gaining direct access to the displaced implants.

Fig. 4: Caldwell-Luc procedure was useful in gaining access to the maxillary sinus by the fenestration of the anterior lateral wall of the maxillary sinus. Note successful retrieval of implant from the maxillary right sinus through the access window.

Therefore, the authors strongly believe that by making a CBCT-based study prior to placing dental implants, displacement of dental implants into the maxillary sinus can be avoided.

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Early childhood caries - Preventive strategies

Dr. Usha Mohan Das, MDH
India

Introduction
Early childhood caries (ECC) is a virulent form of dental caries that can destroy the primary dentition of toddlers and preschool children (Fig. 1).

ECC is a syndrome with both disease and behavioral components. The colloquial term for ECC is “Baby Bottle Tooth Decay” because it is common in young children; a baby bottle, filled with liquids containing sugar, is used as a pacifier in aiding sleep or quietness. Untreated caries may lead to early loss of the primary dentition and affect the growth and maturation of the secondary, adult dentition.

Etiology
Caries is a common, complex, and chronic disease resulting from an imbalance of multiple risk factors & protective factors overtime. Fundamentally, caries is biofilm (plaque)-induced acid, demineralization of enamel or dentin, mediated by saliva. Caries is regarded as an infectious, contagious, and multifactorial disease produced by three primary individual factors: cariogenic microorganisms, cariogenic substrate, and susceptible host (or tooth) (Fig. 2). These factors interact for a certain period of time, causing an imbalance in the demineralization and remineralization between tooth surface and the adjacent plaque (biofilm).

Prevention
Dental caries is still the most common infectious disease among children. It is a preventable disease and its prevention begins at the pediatrician’s clinic. The dentists encourage oral health care providers and caregivers to implement preventive strategies that can decrease a child’s risks of developing this devastating disease. Understanding the acquisition of cariogenic microbes is necessary to improve prevention strategy.

Prevention of ECC is done at different levels, e.g. it can be done at community level which relies on educating mothers in the hope of influencing their dietary habits as well as those of their infants. One can also examine and provide preventive care to the children in private clinics.

It is assumed that an increase in the knowledge, of mothers and caregivers at the community level basis, will influence their self-care habits and dietary practices in turn, improve the dietary and oral hygiene habits of the infants leading to the prevention of the ECC. Many cross-sectional studies have been done to determine the efficacy of educating people at this level which concluded with a modest positive change achieved in the dietary and personal health behaviors of infants at risk of developing ECC.

All infants and toddlers, regardless of their risk status, could benefit from water fluoridation. Water fluoridation has been found to be highly effective (40-60%) in a cross-sectional study in preventing the dental caries in the primary dentition. Furthermore, it has been found to be more effective in preventing dental caries in children from low socio-economic groups which are at high-risk of developing ECC.

While the preventive strategies, at the professional and home level, are not well known by the parents and caregivers, all infants should receive an early dental examination at or before the age of 1 year as recommended by the American Academy of Pediatric Dentistry. Early screening could help in the early identification of incipient carious lesions on smooth tooth surfaces. Additionally, early dental visits provide an opportunity to review feeding and oral hygiene practices and to plan professional fluoride applications.

Study findings support the use of fluoride varnish to prevent ECC and reduce caries increment in very young children. Fluoride varnish efficacy, in this age group, provides the additional rationale for an early dental visit, especially for the high-caries-risk children, since the application of fluoride varnish at this first visit will help reduce future disease (Fig. 5). If applied twice a year, fluoride varnish can reduce decay in baby teeth by 55% & by 46% in the permanent teeth. It is usual to apply fluoride varnish to the teeth of children who already have decayed teeth or are considered to be at increased risk of developing tooth decay.

One approach is to prevent S. mutans from accumulating to pathologic levels through the topical application of antimicrobial agents. The high-risk groups could benefit from the application of chlorhexidine varnishes. A varnish, containing 1% chlorhexidine and thymol, was found to reduce dental caries in the fissures of permanent molars by 50%. Chlorhexidine varnishes may be useful in preventing the transmission of cariogenic bacteria from mothers to infants. A chlorhexidine varnish could be easily applied to infants and toddlers and does not require the same level of moisture control as sealants. Bimonthly topical application of a 10% providone-iodine solution, to the dentition of babies at high risk for ECC, increased disease-free survival.

Finally, for high-ECC-risk infants and toddlers, a special pacifier containing fluoride (0.25 mg), xylitol, and orbital could be efficacious in controlling dental caries. Xylitol-containing gum is effective in preventing dental caries in primary teeth, though it is impractical for use in infants and toddlers. For infants and toddlers, a pacifier, containing xylitol, is a novel idea that could be used as a temporary substitute for feeding at night or bed time or for a pacifier laced with sugar.

Another promising approach toward primary prevention of ECC is to develop strategies that target the infectious component of this disease, for example, by preventing or delaying primary acquisition of S. mutans at an early age through suppression of maternal reservoirs of the organism. There is evidence that cariogenic bacteria (mutant streptococcus mutans) are transmitted from mothers to infants. The goal of primary prevention is to decrease or postpone the transmission of mutant streptococcus mutan from mother to child. This goal can be achieved by cutting the main routes of transmission (e.g., pacifiers, spoons) and by suppressing the levels of mutant S. mutan in highly infected mothers.

Preventive programs targeting mothers have been implemented during pregnancy or when the infants were 5 to 8 months of age, with evaluation on a long-term basis. The controlled studies have generally included dental treatment, oral health information, and counseling as well as topical treatments of the mothers with various antibacterial agents, such as chlorhexidine, fluoride for the bacterial suppression.

Conclusion
ECC is characterized by severe decay in the teeth of infants or young children. As we know, ECC is a multifactor disease like any other form of caries involving three primary factors. To prevent development of any carious lesions, the primary caretakers are advised to check their baby’s mouth regularly by lifting the lips and cheeks on both sides. Also, parents should be educated about the feeding habits and the precautions to be taken while feeding their baby.

Prevention of cariogenic feeding behaviours is one approach to prevent ECC. Always clean the baby’s teeth with warm-wet-cloth after feeding, and begin brushing teeth as soon as the first tooth erupts. And most importantly, if the mother or caretaker first notices any discoloration of teeth, they should immediately approach the dentist for timely intervention.

Fig. 1: Four-year-old child with ECC

Fig. 2: Caries etiology triad

Fig. 3: Tray with fluoride foam

Fig. 4: Tray with fluoride foam

Fig. 5: Fluoride varnish
Miniscrews—a focal point in practice

Clinical examples (1)

**Horizontal tooth displacement**

Lack of space is one of the main reasons for the oblique positioning of teeth. One way to solve this problem is to create the necessary space. Conversely, premature loss of teeth or anatomical abnormalities may result in gaps that require modification for various reasons. For the correction of horizontal tooth displacement, miniscrews can be used, as these produce no undesirable reactive effects.

**Distalisation**

The first case (Figs. 1a–c) presented involves a frequently encountered problem: the patient’s molars had migrated in a mesial direction. This resulted in a marked loss of space in the region of the canines. The two treatment options in such a case are extraction or distalisation. In this case, distalisation was a viable option and extraction was unnecessary. Conventional techniques for distalisation (apart from the use of headgear) require support from other groups of teeth. Creating anchorage in this way has negative reactive effects. In the example under consideration, it is highly probable that protrusion of the anterior teeth would have resulted, should a conventional method for distalisation have been employed. Such negative results can be avoided by the use of miniscrews.

Miniscrews can be inserted in the vestibular and— as in this example—palatal areas. Vestibular insertion of a miniscrew (e.g. between the premolars) is always associated with the miniscrew’s eventual interference with tooth migration. When this occurs, the miniscrew must be extracted and a conventional form of anchorage/blocking (e.g. a ligature) must then be used. In this case, the presence of the primary molars represented a contraindication for insertion on the vestibular side of the premolar region. The paramedian insertion of two miniscrews has several advantages. Firstly, the miniscrew groove provides the necessary basis for anchorage of the distalisation appliance. Secondly, they will never impede the movement of the lateral teeth. Even after successful molar distalisation, they can be used to stabilise the situation achieved for the remainder of the treatment. Thirdly, there is no risk of damaging other teeth because of an unfavourable spatial situation and/or incorrect insertion.

One disadvantage of the coupling necessary between the Walde Frog Appliance used (FORESTADENT) and the miniscrews (see Figs. 1a–c) is that cleaning becomes difficult. As large areas of the mucous membrane are covered, there is the risk of the development of peri-mucositis. If this develops further into peri-implantitis, premature loss of the miniscrews could result. A possible future alternative could be the use of ‘laboratory abutments’ (Figs. 2a–d), which contain no plastics and can be used to couple the appliance with the miniscrews entirely hygienically.

**Mesialisation**

One of the most problematic areas of orthodontic therapy is the correction of the anterior displacement of teeth, and particularly of jaw segments. It could seem that the availability of miniscrews means that conventional appliances no longer need to be used at all. However, depending on the baseline situation and the nature of the required correction, the use of a combination of devices and appliances is recommended. This is often advisable and may even be necessary for biomechanical reasons, such as in a Class III situation. In the case shown in Figures 3a to c, forced transverse expansion of the palatine suture was used in combination with mesial traction, applied by means of a Delaire facial mask. The support provided by two miniscrews inserted in the paramedian region redirected the forces of sagittal and transverse movements almost entirely onto the bones. Dental side effects were interception of the opposing forces is a major consideration within the therapeutic strategy. The orthopaedic closure of dental spaces using miniscrews is highly recommended if:

- there are no alternative, viable conventional methods and/or there is insufficient certainty that these will be effective;
- the extensive use of braces is to be avoided for cosmetic or functional reasons;
- a short-term treatment or partial treatment is required that does not involve correction and realignment of the basic dental arch;
- asymmetrical treatments are associated with the risk of midline displacement and the possibility of compensatory extraction;
- or a suitable dental baseline situation is to be created for pre-prosthetic treatments.

**Space closure**

Owing to the availability of miniscrews, new therapeutic techniques can now be used, particularly for the management of the partially edentulous situation that obviates the need for compensatory extractions and the problem of the loss of stability of the units used for anchorage support. It is here that the effect of Newton’s Third Law is particularly apparent, and the forces of closure are also effective;...
median or paramedian region can be used to stabilise the anterior teeth. Using the standard vestibular mechanical techniques, the gap can be closed without altering the position of the incisors.

En masse or canine retraction
(e.g. where the premolars are missing)

Miniscrews can also be used as an aid in this form of treatment (Figs. 5a–c). In contrast with the conventional appliances, there is no loss of anchorage but rather a biomechanical benefit in terms of more favourable direction of forces. If the miniscrew and the fitting for the active element (traction spring or elastic chain) are positioned, the gap can be closed without altering the position of the incisors.

Space closure in the molar region
(e.g. to avoid the need for prosthetic measures)

Premature loss of the primary molars has not yet been eradicated despite all the advances made in prophylactic treatments. There may be a need for appropriate therapy, particularly in cases in which the adjacent teeth are not carious (Fig. 6a–c). What should the patient be offered—implants, bridges or space closure treatment? With a view to the realistic long-term prognosis for the anchorage teeth, conservation of the surviving natural teeth, and the minimisation of the effects on the existing structures, a prosthetic solution would not appear to be appropriate. The basic concept of restorative dentistry—first destroy, in order to reconstruct—is frequently not the best solution. Let us assume that the approach adopted is to mesialise tooth 27, in order to compensate—for using a natural method—for the loss. The skeletal anchorage means that undesirable side effects, such as reciprocal space closure, are avoided. Only a few elements (brackets, springs etc.) are needed to support the mesial movement. The treatment remains invisible to the casual observer, while in comparison with the stated alternatives, it is very cost-effective and provides for a high level of conservation of the natural elements. The prognosis for the long-term preservation of the natural teeth is very good.

Vertical tooth displacement

Any displacement of the teeth along the vertical axis can present a cosmetic and/or functional problem. The solution is extrusion or intrusion using skeletal anchorage. This technique is very simple to implement and very cost-effective.

Extrusion
Extrusion using miniscrews may be used for single teeth (Figs. 7a–c) and for groups of teeth (Figs. 8a & b). Trauma had caused the intrusion of tooth 22 (Figs. 7a–c). The tooth was returned to its original position within three months by means of the indirect anchorage of tooth 25 to a miniscrew using a straight wire appliance. In the case of a bite that exposed tongue and bone (Figs. 8a & b), the approach adopted was to provide transverse expansion and extrusion of the anterior teeth. Intermaxillary rubber traction braces connected to miniscrews in the lower jaw were used. If the braces had been connected to the lower anterior teeth, undesirable extrusion of these would have resulted (every action has an equal and opposite reaction). Because of the small root surface, this process would have occurred in a much shorter space of time than in the case of the upper anterior teeth. The opposing bone in the lower jaw prevented this undesirable reactive effect.

Intrusion
This open bite with extrusion of the tongue (Figs. 9a & b) was treated by means of intrusion of the molars and consequent caudal rotation of the maxilla. Miniscrews were inserted in the first and second quadrants in each case between the canine and the first premolar. A Titanol Uprighting Spring (FÖRESTADENT) was attached to the capstan of the miniscrew, and the screw was set to intrude. There was even some overcorrection of the positioning of the first molars on both sides after five months’ intrusion, resulting in closure of the frontal bite.

Conclusions
It may be necessary for therapists to overcome logistical and emotional barriers before they can begin to employ miniscrews, but it is only when they are used that their versatility becomes apparent. Miniscrews make our routine work that much simpler. They enhance the efficiency and effectiveness of many dental appliances, resulting in an overall improvement in treatment quality.

Contact Info
Dr. Björn Ludwig
Am Bahnhof 54
56841 Traben-Trarbach, Germany
Tel.: +49 65 41 81 85 81
Fax: +49 65 41 81 85 94
E-mail: bludig@gmail.com
kiefert@apoedic-mosel.de

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