New tests confirm lax attitude towards amalgam use and management

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Dental hospitals in Pakistan are significantly polluted with mercury. New tests confirm lax attitude towards amalgam use and management.

Daniel Zimmermann
DTI

ISLAMABAD and RAWALPINDI, Pakistan: The results of nationwide tests conducted throughout Pakistan have raised the alarm over the high levels of mercury pollution in dental hospitals. In some of the tested sites in the twin cities of Islamabad and Rawalpindi, the amount of the toxic metal detected in the air was found to be up to 20 times higher than acceptable levels.

According to the monitoring team from the Sustainable Development Policy Institute, an independent development and policy analysis organisation in Islamabad, dental personnel working in the affected facilities were recently informed about the results and given recommendations about a number of safety measures. They were also advised on how to reduce the use of mercury in dental practice in general.

Despite the availability of alternative filling materials such as composite resins, amalgam remains the most widely used dental restorative in Pakistan. Waste management of the material, however, has traditionally been poor. According to the results of a study conducted in 2007 by researchers from the Riphah International University’s dentistry college, over 90 per cent of dentists in the country still dispose of used amalgam through regular waste or the waste-water system. Only 1 per cent of dentists use the fabrication of indirect, fixed or removable restorations, so that you have quality products.

Amalgam remains the most widely used dental restorative in Pakistan. (DIT/Photo Szasz-Fabian Jozsef, Romania)

Legal battle over dentist’s death continues

The death of an Indian dentist in Ireland, which caused diplomatic rows in both countries, could soon end up in European courts, as the family of Savita Halappanavar, who died after miscarriage of her baby in a hospital in Galway last October, is considering taking the case to the European Court of Justice in Brussels in June, the newspaper ‘Irish Independent’ has reported.

The medical incident has been the subject of ongoing debate in the ultra-Catholic country, as well as internationally, owing to the circumstances of Halappanavar’s death, which, according to reports, has largely been blamed on medical personnel denying her a termination of pregnancy over the course of several days owing to the country’s very strict abortion laws. Since then, the government in Dublin has drafted a bill to be put before Parliament that could make abortion by Irish doctors legal when the life of the mother is at risk.

In anticipation of this year’s congress, which will be hosted by the Turkish Dental Association in Istanbul, the FDI World Dental Federation has disclosed the venue for the event next year. According to a press release by the Turkish Dental Association, which currently has over 50,000 members and operates through 28 state branches, more than 350 local branches and one defence branch. The World Dental Congress will be held in New Delhi from 11 to 14 September next year, exactly ten years after the congress took place there in 2004.

The event will be hosted by the FDI in collaboration with its national member, the Indian Dental Association, which currently has over 50,000 members and operates through 28 state branches, more than 550 local branches and one defence branch.

DTI expands to South Africa

With Modern Dentistry Media in Cape Town, another publisher has recently joined the Dental Tribune International Publishing Group. The first Dental Tribune South Africa edition is going to be released in June together with Modern Dentistry Media’s flagship publication International Dentistry South Africa.

Dentophobia passes generations

Parents can pass dental anxiety on to their children, which may prevent them from attending routine dental check-ups later in life, research from the US suggests. In a survey conducted on over 900 primary caregivers, the percentage of children with dentophobia was higher when parents already suffered from the condition.

India hosts FDI congress in 2014

In India, a hands-on workshop at this year’s International Symposium of the Osteology Foundation in Monaco. The organisation celebrated its 10th anniversary meeting this year.

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Japan begins standardisation of dental records with trial

TOKYO, Japan: The Japanese Ministry of Health, Labour and Welfare is reported to have released funding for a pilot project that aims to standardise the format of electronic dental records to make dental practices nationwide. If successful, the measure is supposed to improve the identification of victims of crime or mass disasters such as the March 2011 earthquake.

According to reports by the Tokyo newspaper The Mainichi Shimbun, the ministry has allocated ¥21 million (approximately US$160,000) from its budget for the project over the next fiscal year. The new format will be introduced in several dental clinics by the beginning of 2014, it said.

A review panel will be also set up in June to discuss the further standardisation of record formats for body identification.

Dental records in Japan have been primarily stored on paper or film thus far. This made victim identification difficult for forensic experts when archives were swept away or made unusable by the tsunami following the March 11 earthquake. In the coastal town of Minamisanriku north of Fukushima, for example, all dental clinics, along with their patient files, were destroyed as reported by Dental Tribune in September 2011.

Electronic records existed before the disaster but they were often stored in different formats, which made accessing the data in the aftermath laborious because it first had to be converted.

Overall, dentists were still able to identify 14 per cent of the 8,700 bodies through forensic examination, which according to the President of the Japan Dental Association, Dr Mitsuo Okubo, proved significantly more effective than DNA or fingerprint matching. In a recent interview, he told Dental Tribune Asia Pacific that a new system could expedite the identification process dramatically through automated dental matching tests. A full-fledged system is most likely to be implemented within three to five years, he predicted.

Owing to its close proximity to the boundary of two tectonic plates, Japan experiences between 1,500 and 2,000 earthquakes of different magnitudes per year.

With over 140,000 casualties, the most deadly occurred in the Kantō region in the early 1920s. The March 11 earthquake is currently estimated to have killed almost 16,000 people and destroyed or damaged one million homes.

According to recent probability predictions by geological experts, another magnitude 7.0 earthquake could strike the southern part of the country as early as next year.
Singapore to extend subsidised dental health care

Daniel Zimmermann

SINGAPORE: Singapore’s health minister Gan Kim Yong has recently announced incentives to encourage more dental clinics and practices to sign up for the Community Health Assist Scheme (CHAS), which provides subsidies for the treatment of medical and dental conditions. In response to questions from members of parliament last month, Yong revealed that another 50 dental health care facilities are expected to join the scheme this year.

Since the introduction of the programme in January last year, the number of dental clinics participating in the scheme has risen to 295, according to Yong, an increase of over 20 per cent compared with last year.

He added that the ministry aims to focus on underserved areas in the context of the expansion but will continue to maintain an equal geographical spread of clinics participating in the scheme nationwide to make sure that the maximum of people are able to claim benefits.

According to the ministry’s latest figures, over 200,000 people were eligible for subsidy under CHAS by the end of 2012. A replacement of the Primary Care Partnership Scheme, it allows Singaporeans over the age of 40 with low income and disabled people to seek medical and dental treatment in private clinics or practices.

1 in 20 dentists is reported to have an amalgam separator installed in their practice, mainly owing to financial constraints or a lack of knowledge regarding such measures.

Although studies in Europe have indicated that regular use of amalgam and its disposal do not pose significant health risks to dental personal, exposure to high levels of mercury has been proven to damage kidneys, the nervous system and the gastrointestinal tract.

“The health of staff working under these conditions will be impaired in the same way as that of dental nurses in Norway and New Zealand, for example, who were using copper amalgam a few decades ago,” commented amalgam expert Lars Hylander from Sweden. “Also, a recent EU study indicated substantial loss of IQ in European dentists due to mercury exposure.”

Final results from the project are expected to be published later this year after the testing in several cities has been completed. A first in Pakistan, the project seeks to provide reliable data on indoor and outdoor mercury pollution throughout the Western Asian country. The project is being conducted in collaboration with the European Environmental Bureau and the Zero Mercury Working Group, a coalition of non-governmental organisations aimed at the reduction of mercury worldwide. In addition to dental offices, the project has been targeting light manufacturing facilities, among others.

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Dear reader,

Daniel Zimmermann

Early childhood caries is among the greatest challenges that dentists have to face today. According to latest figures of the World Health Organisation, infection rates with the Streptococcus mutans bacterium exceed 70 per cent not only in poor countries but also in some parts of the developed world. New detection technologies like laser fluorescence have become available in recent years, but the condition remains a complex and difficult problem requiring a multitude of factors.

In our first Paediatric Tribune, which is included in this edition of DT Asia Pacific, Dr Man Wai Ng from the Boston Children’s Hospital in the US is discussing a new chronic disease management approach that has proven successful to address the process of the disease. Along with her article, you will also find more insights in other current issues in pediatric dentistry such as the risk of radiation exposure and the treatment of special care patients. I wish you an interesting read with this edition.

Yours sincerely,
Daniel Zimmermann
Group Editor Dental Tribune International

Tooth regeneration: news and hurdles

Dr Jeremy J. Mao

Recently, Prof. Cheng-Ming Chuong's group at the University of Southern California demonstrated a specialised stem cell niche that appears to stimulate repetitive renewal of alligator teeth. These findings, along with several other important reports in the past two years or so, will continue to enrich our understanding of stem/progenitor cells and regulatory molecules that are pivotal to tooth development and regeneration.

Translation of experimental findings to therapeutics that lead to human tooth regeneration is a lengthy process. An important contribution from Prof. Takashi Tsuji's group at the Tokyo University of Science has shown that embryonic germ cells can differentiate into tooth-forming cells and a regenerated tooth. Recently, Prof. Paul Sharpe's group at King's College London showed that a combination of embryonic tooth germ cells and postnatal cells also led to regenerated tooth organs.

The remaining tasks for regeneration of human teeth however are many: how to replace embryonic tooth germ cells with adult stem/progenitor cells and how to enable alligator tooth succession signals in humans.

The field of tooth regeneration has diverged into two subfields: first, a near-term goal to regenerate functional tooth roots that integrate with the alveolar bone via a periodontal ligament, and, second, a long-term goal to regenerate an entire tooth, with enamel, dentine, dental pulp and cementum, that also integrates with the alveolar bone via a periodontal ligament. These two goals were delineated in a recent article in Cell Stem Cell.

Undoubtedly, new discoveries will advance experimental approaches step by step towards regeneration of tooth roots or entire teeth in patients. The question is not whether (for stem cells do form teeth during development), but when we will be able to understand and manipulate stem cells to form teeth in adult patients. The timeline depends on not only scientific progress but also regulatory approval processes.

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Dr Sushil Koirala
Nepal

A complex clinical situation

Light-curing micro-hybrid composite
• universal range of application
• high filler content
• excellent physical properties
• fast and easy application

Glass ionomer filling cement
• perfectly packable consistency
• excellent durable aesthetics
• also available as application capsules

Dental desensitising varnish
• treatment of hypersensitive dentine
• fast desensitisation
• fluoride release
• easy and fast application

Dr Sushil Koirala
Nepal
Regrowing a tooth might be a concept years away from realization, but scientists in the US and Asia have reported the discovery of a new source of cells that could help to stimulate the renewal of dental cells in humans in the future: alligators.

Similar to most mammalians, these cold-blooded animals have the ability to replace lost teeth by simply regrowing new ones. What made them particularly interesting for the researchers was the fact that unlike sharks, whose regenerating teeth are just an extension of the skin, the structure of an alligator’s dentition is very similar to humans’ dentition, with teeth implanted in the sockets of the jawbone.

Both humans and alligators also possess a band of epithelial tissue, which, after having investigated it using microscopy imaging techniques, the researchers believe to contain cells that trigger the permanent replacement of teeth in the animals.

While alligators can replace their teeth throughout their lives through this dental lamina, tooth development in humans usually stops with the adult teeth, except for the condition of hyperdontia or supernumerary teeth, which has been related to congenital disorders, among other causes. The research team, which consisted of researchers and clinicians from the Keck School of Medicine of the University of Southern California (USC) and other institutes in the US, Taiwan and China, is now planning to isolate those cells and investigate their potential for use in regenerative medicine. They aim to gather more information about the molecular networks that are behind the renewal process.

“Ultimately, we want to identify stem cells that can be used as a resource to stimulate tooth renewal in adult humans who have lost teeth. But, to do that, we must first understand how they are renewed in other animals,” said Cheng-Ming Choung, head author and USC pathology professor.

Alligators are estimated to be able to replace their teeth up to 50 times during their lifetime. Although specimens of 100 years and older have been reported by zoologists, the reptile lives an average of between 40 and 50 years. The species, whose origins can be traced back to over 65 million years ago, inhabits only parts of China and the US.

Prior research in tooth regeneration has focused on using or reprogramming nondental cells, as stem cells derived from human dental tissue have not proven to be a substantial source for tooth bioengineering yet. In recent experiments, however, scientists from the Dental Institute at King’s College London reported the successful combination of isolated adult human gingival tissue from dental patients with tooth-forming cells from mice.
Immediate implantation in combination with biomaterials can effectively prevent bone resorption after tooth extraction. This was one of the key findings presented at the tenth International Osteology Symposium in Monaco last month.

Well-known periodontologist Prof. Jan Lindhe from Sweden told event participants in a keynote lecture that although bone resorption in the mesiodistal dimension can be prevented through immediate implant placement, preclinical studies have shown that ridge preservation procedures with biomaterials are usually required to preserve the bucco-palatal dimension too, a discovery also confirmed by fellow presenter Dr Dietmar Weng from Germany.

Presentations on other important aspects of dental implant therapy included soft-tissue management and peri-implantitis, the frequency of which, according to presenter Björn Klinge from the Department of Dental Medicine at the Karolinska Institutet in Stockholm, Sweden, remains difficult to assess owing to contradictory scientific data and differences regarding its definition. While the prevalence of the condition itself remains a matter of debate, there was general agreement that primary contributing factors include inadequate bone volume, as well as the distance between and the position of the implants.

In addition, new clinical evidence was presented that supports the assumption that sufficiently keratinised mucosa around implants can prevent peri-implantitis. Biomaterials offer significant advantages over connective tissue grafts or free gingival grafts in this regard because their use has demonstrated greater patient satisfaction owing to the reduction in operating time and post-operative pain, according to US periodontist Todd Scheyer.

This year was the second time that the Osteology Foundation held its scientific symposium in Monaco. Established through a partnership between Dr Peter Geistlich, founder and former CEO of the company with the same name, Dr Philip Boyne from the Loma Linda University and Harvard professor Myron Spector a decade ago, the foundation based in Switzerland has become a leading platform for research on regenerative therapies for oral tissue.

Since 2003, it has spent CHF0.5 million annually for funding scientific studies on the topics of regenerative dentistry and dental-tissue engineering, according to its figures, among them a recent paper by a clinical team from the Faculty of Dentistry at the Complutense University of Madrid that evaluated a novel flapless technique for cleft-palate repair by injection of a BMP-2-containing hydrogel.

Overall, more than 40 studies conducted by researchers around the world have been financially supported this way over the last ten years, the foundation said. This year’s Osteology Research Prize was awarded to clinicians from Spain and Italy.

It also holds regular scientific symposiums to educate practitioners on the subject of regenerative dentistry. This year’s edition drew 2,700 participants to Monaco. Besides 60 scientific presentations, the event offered pre-congress hands-on workshops, a research forum, a poster exhibition and an industry showcase. The next edition is to be held in 2016.
Replacing toothbrush after sore throat may be unnecessary

WASHINGTON, USA: Researchers from the US have found that it may not be necessary to discard children’s toothbrushes upon diagnosis of streptococcal pharyngitis, as is commonly advised. Their study showed no evidence of increased bacterial growth on the toothbrushes of infected children.

In a preliminary experiment, the researchers grew group A streptococcus (GAS), the bacterium that causes strep throat, on toothbrushes of infected children. In the subsequent human study, 14 patients diagnosed with strep throat, 15 patients with sore throat, and 27 healthy individuals aged 2 to 20 were instructed to brush their teeth for more than one minute using a new toothbrush. When testing for bacterial growth, the researchers found GAS only on one toothbrush, which had been used for more than one minute.

However, GAS also grew on new control toothbrushes that had not been exposed to the bacterium but had been removed from their sterile packaging. The study, conducted as a telephone survey by market research agency ORC International on behalf of Aspen Dental, one of the largest networks of dental care providers in the US, revealed that 36 per cent have dental insurance. Although more than 80 per cent knew about the long-term financial implications of neglecting oral health, many people seemed to put dental care off until they experienced significant pain or had a dental emergency, the investigators said.

The survey involved 501 men and 504 women aged 18 and older. It was conducted as a telephone survey by market research agency ORC International on behalf of Aspen Dental, one of the largest networks of dental care providers in the US, between 28 Feb and 3 March. Overall, the results were in line with other studies that found a general decline in health care spending. More than 50 per cent of the people surveyed reported that their net salary was lower this year than in 2012. Moreover, 44 per cent had no dental insurance. The number was especially high among those with an annual income below US$35,000 (61 per cent), the investigators said.

They also found that only 1 in 10 agreed that routine dental visits were critical to their overall well-being. “Since the recession began five years ago, the patients who walk through my doors have been increasingly stressed out about whether they can afford the care they need,” said Dr Nathan Laughrey, who runs a number of Aspen Dental practices. “The survey is a stark reminder of the need to improve public understanding about the importance of dental care to overall health, as well as to create a better understanding about the long-term effects of ignoring dental visits, including the link between gum disease and other serious conditions such as diabetes and stroke.”

L. Bowen, co-author of the study and associate professor at the University of Texas Medical Branch’s Department of Pediatrics, which conducted the research. As the current study only involved a small sample size, larger studies are needed to confirm that GAS does not grow on toothbrushes used at home by children with an infection, she added.

The findings were presented at the annual meeting of the Pediatric Academic Societies in Washington, DC, in May.

syraCuse, ny, usa: a survey of more than 1,000 US adults has revealed that 56 per cent have delayed or would delay dental treatments owing to their current financial situation. Although more than 80 per cent knew about the long-term financial implications of neglecting oral health, many people seemed to put dental care off until they experienced significant pain or had a dental emergency, the investigators said.

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Bupa takeover of Dental Corporation is close to completion

DT Asia Pacific

MELBOURNE, Australia/LONDON, U.K.: The Supreme Court of Victoria in Melbourne, Australia, last month approved Bupa’s acquisition of Dental Corporation (DC) from Fortis Healthcare International in Singapore. The British company is expected to become sole owner of Australia and New Zealand’s largest dental chain by the end of May.

In a press release, Managing Director of Bupa Australia and New Zealand Dean Holden said that his company will be focusing on aligning both businesses seamlessly over the next few months. To this end, it will continue closely with DC’s senior management and staff.

Representatives of DC confirmed that the majority of its shareholders had agreed to the owner change.

The acquisition is Bupa’s first venture into the dental health care business. In addition to insurance, the company offers a number of other health-related services to 15 million customers in Europe, Asia, Latin America and the Middle East.

Fortis’s Singapore subsidiary divested its 64 per cent majority stake in DC at the end of last year, saying that it needed to cut debt in its global business. According to Bupa, it will pay more than A$570 million (US$585 million) for the transaction, of which the Indian health care giant will receive 72 per cent or A$270 million (US$261 million). The remaining A$100 million (US$97 million) will be paid to DC employees directly over the course of the next three years, according to the company.

DC currently employs more than 2,300 people, including 560 dentists in Australia and New Zealand. For the last fiscal year, the chain reported net revenue of A$559 million (US$528 million) from its dental businesses in both markets.

The immediate result of this collaboration is the first International Fellowship in Laser Dentistry Postgraduate Diploma, which is being promoted in China. The course’s first module was offered to a selected number of dentists. However, a greater number of participants will be able to enrol for the July and August modules. In September, a Chinese delegation from Capital Medical University and all fellowship participants will travel to Italy, where the participants will sit the examination and receive the University of Genoa diploma.

This fellowship offers an important opportunity to obtain high-level medical training in laser dentistry, a growing field that requires in-depth knowledge, experience and proper equipment.

Dental laser manufacturers Beijing Tongxin Technology & Trading and doctor smile (LABMIDA Spa) coordinated the events when the agreement was signed.

With growth in China, GlamSmile targets expansion

Dental Tribune Asia Pacific

BEIJING, China: Cosmetic dentistry provider GlamSmile continues to grow in China. According to the Beijing company, it generated more than 4.5 million in revenue in local currency from its four veneer studios last month. It has also announced that it is currently in the process of hiring new staff for the three new studios it intends to open later this year in several cities in south central China.

Construction work for studios in Guangzhou, to be located in the city’s International Finance Centre, and Wuhan commenced recently. A studio in Shenzhen is currently in predevelopment, GlamSmile has reported.

According to the company, its current flagship studio in Beijing will be moved from its current location to the central business district of the capital and be expanded in order to accommodate up to 15 chairs.

This was the first studio run by GlamSmile in China when it opened in 2006.

“We are confident that our revenue will grow by leaps and bounds, since dental care expenses per person in China are still very low compared with other countries. There is a lot of room for growth in the near future,” commented CEO David Lok on the plans.

GlamSmile studios have been put into operation in over 40 cities around the world since the concept was launched in Europe and the US in 2007. In Asia, franchise studios have been opened in Malaysia and Taiwan. The system developed and distributed by Remendet is based on a one-at-a-time veneer placement method that, according to the Belgian company, involves a proprietary fabrication technique and a single-motion placement tray. It is supposed to allow dentists to seat ten veneers within an hour.

Dental veneers are part of China’s booming cosmetic surgery market, which is estimated to be worth more than US$2.4 billion. Lok told Dental Tribune Asia Pacific that his company aims to increase its current staff by more than 40 per cent for the expansion. Besides its studio in Beijing, it maintains three operations in Shanghai, Wenzhou and the Hong Kong Special Administrative Region.

It is the largest dental chain by sole owner of Australia and New Zealand, and the Middle East.

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Dental laser manufacturers Beijing Tongxin Technology & Trading and doctor smile (LABMIDA Spa) coordinated the events when the agreement was signed.

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Premier’s Traxodent with Hemodont Paste Retraction System

PLYMOUTH MEETING, USA: Premier Dental’s Traxodent is a retraction and haemostatic system for use prior to impression taking, cementation, bonding procedures and any procedures for which retraction and haemostasis are required. According to the US manufacturer, Traxodent provides predictable tissue management for accurately detailed impressions with less retakes.

The absorbent paste contains 15% aluminium chloride, a clinically proven and effective haemostatic agent. Owing to its astringent properties, it works synergistically and displaces soft tissue, the company said.

Traxodent can be dispensed directly from the ergonomic syringe into the sulcus or can be used in combination with a Premier Retraction Cap for maximum tissue deflection. The fluid is absorbed while Traxodent occupies the sulcus. After two minutes, Traxodent is rinsed away, leaving an open, retracted sulcus.

Each Traxodent kit comes with pre-filled syringes packaged in individual foil pouches for maximum freshness and applicator tips. It is available as a 7-syringe starter pack and 25-syringe value pack. A member of the Giomer family of restoratives, Beautifil Injectable was developed with a unique resin micro-structure that is said to offer mechanical properties for remarkable performance even in load bearing areas. According to the Japanese manufacturer, the paste has ideal viscosity and a non-tacky, non-droopy consistency for restorations that can be easily shaped as clinicians extrude the material from the syringe. Having optimised the filler-matrix complex, Beautifil Injectable controls light diffusion within in order to mimic the optical characteristics of natural teeth.

The combination of strength, durability and sustained fluoride protection makes it ideal for multiple applications, including the restoration of Class I and II cavities, repair of fractured amalgam or as a strong base under amalgam and composite restorations. It is also suitable for all classes of cavities where radiopacity is a prime requirement, the build-up of structural core, as well as on the root surfaces where overdentures are placed. According to SHOFU, clinicians can further use it as a long-term temporary replacement for cusps as well as for minimal intervention treatment and ART techniques.

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The restoration of dentition with implants has become an established procedure throughout the world. Owing to ongoing research and development in this field, this treatment modality has become increasingly popular. Furthermore, the number of companies that manufacture dental implants and the corresponding prosthetic components has risen commensurate to the speed at which the advancements have been made. However, the large number of commercially available systems has not helped much to improve aesthetics and function. Clinicians find themselves overwhelmed by the confusing variety of products and have trouble selecting the components that suit the treatment modality best.

Implant-supported crowns are not all the same: each patient has individual needs that have to be taken into consideration. Generally, abutments are divided into two categories: ready-made or customised (titanium, zirconium oxide, etc.). Ready-made abutments are machined components with standardised shapes and dimensions, while custom-made abutments are specially created for each patient.

Customised abutments are considered an efficient solution for placing a restoration on an implant. Moreover, this type of abutment offers more control over the aesthetic and functional aspects of the restoration than ready-made abutments do. The benefits of customised abutments include the improvement of aesthetics, excellent accuracy of fit, as well as the thorough and precise removal of excess cement in the luting of crowns.

In combination with a titanium base, lithium disilicate abutments such as the new IPS e.max Press abutment (Ivoclar Vivadent) offer an optimum solution for fabricating functional implant-supported restorations (strength of 400 MPa), as well as satisfying discerning aesthetic demands. In this way, implant-supported restorations can be tailored to the needs of the individual patient. The durable bond between the two components, that is, the titanium base and lithium disilicate, is created with the self-curing luting composite Multilink Implant (Ivoclar Vivadent)—which can also be light cured if desired. The following case report demonstrates the effective combination of an anterior dental implant with an individually created abutment (press technique) and an aesthetic crown produced in the same way.

Case report

A 42-year-old patient consulted the practice owing to a root fracture, which had caused discoloration of tooth 11 (Figs. 1 & 2). After a thorough diagnosis revealed that the tooth could not be preserved, a new restoration was planned. The tooth was extracted (Fig. 3) and a conical NanoTite Certain Implant (diameter 4.1 mm; BIOMET 3i) was inserted. During the healing period of about 90 days, the laboratory-fabricated provisional restoration was sealed (Fig. 4).
A commercial titanium base that complies with the instructions for use for IPS e.max Press Abutment Solutions was selected for the fabrication of the customised abutment. According to the directions, only bases made of titanium or titanium alloys with a shoulder margin width of at least 0.6 mm and a height of at least 4.0 mm should be used. In the case presented, we decided to use a titanium base coated with titanium nitride.

Since the ideal crown shape had already been determined during the wax-up stage, the subsequent working steps were carried out efficiently with the silicone matrix, which was based on the wax-up. The abutment was built up in wax and, its shape and size were checked against the matrix. Then, the built-up abutment was reproduced with silicone matrix, which was based on the wax-up. The abutment was then invested and its fit checked. The customised abutment and the completed ceramic crown are ready for permanent placement.

The customised abutment and the completed ceramic crown are ready for permanent placement. The customised abutment and crown are seated without interference. After the healing phase, the implant was exposed and the provisional fabricated in the laboratory was placed. The provisional was adjusted to the gingival situation in order to stabilise the peri-implant soft tissue. Next, the precision impressions and all of the required information were conveyed to the dental laboratory. The models were fabricated in the customary way in the dental laboratory (Figs. 5a–c). Precision is also essential in this process. The models were subsequently placed in the articulator and the occlusion with the maxillo-mandibular relationship recorded.

The shape and surface structure of the tooth look very natural. As a result, the crown can be seen and it appears to emerge from the gingival tissue like a natural tooth. The underlying components, however, are very important and it is the dental team's responsibility to select them properly in order to achieve natural-looking results (Figs. 14 & 15).
Implant-prosthetic rehabilitation of the severely atrophic maxilla

Modern instrumentation and improvements in regenerative techniques have facilitated both the surgical treatment and the subsequent prosthetic restorations. Nevertheless, dentists and patients frequently are conflicted when deciding between fixed or removable full-arch restorations.

Many patients, especially those requiring extensive rehabilitation, clearly prefer fixed, implant-retained restorations. Under certain circumstances, the patient’s aesthetic demands, however, can be difficult to satisfy with this type of restoration. Aesthetic outcomes are most frequently hindered by bone loss resulting from advanced periodontal disease or by bone resorption following tooth loss. Although several methods can be used to augment hard and soft tissue to meet aesthetic demands, the patient can reject these options or the dentist might not be entirely familiar with the procedure selected.

Both scenarios may produce unsatisfactory results that become apparent only when treatment is complete. Removable restorations that use telescopic crowns as attachments are an alternative to full-arch rehabilitation with fixed bridges. Removable restorations can be used especially in cases with extensive jawbone atrophy (e.g. resorption), resulting in a large vertical dimension. This article presents the treatment of such a case.

**Case**

The 55-year-old patient (male, nonsmoker, in good general health) presented for consultation and treatment in our clinic in August 2010. The patient had a three-year-old removable denture (with mid-palatal strap) in the maxilla, supported by four implants using telescopic crowns as attachments (Table 1; Figs. 1 & 2). It was shown that the premolars/first molars of the maxillary denture were not in occlusion with the mandibular teeth (Figs. 3 & 4). Furthermore, the denture was fabricated with a sagittal malposition in the anterior area (Figs. 3 & 4). Around the implants, pockets of 6-10 mm with spontaneous bleeding, swelling of the soft periimplant tissue and pain by palpation were recorded (Figs. 3 & 4).

A 15-year-old removable partial denture and fixed partial dentures (FPDs) were found in the mandible. The removable partial denture used the following attachments: a) direct retainers (clasps, areas 457 and 454), b) customised gold attachment (area 454-55), c) a gold double crown (area 447) (Figs. 3 & 4). The periodontal tissue showed an inflamed gingiva, pockets of a depth of 5 to 6 mm and a deep vertical bone defect at the mesial side of the tooth #447 (Fig. 2).

**Treatment**

Implants #15, 25, and 24 were explanted, the bone defects were cleaned and augmented by using non-resorbable dPTFE membranes (Cytoplast, Regentex, GBR-200, Osteogenics Biomedical, Lubbock, USA) without additional use of any grafting materials, as previously described (Figs 3 & 4). Flaps were repositioned with interrupted sutures. Membranes were left partially exposed (Area #47) (Figs. 3 & 4). The implant #14 (incl. abutment) was replaced through a locator and locator’s matrices were embedded in the basis of both the denture and the DentDu (Figs. 9).

Four weeks after socket augmentation and preservation, membranes were removed (Figs. 10 & 11). Four implants were placed in the mandible (#36, 45, 42; Table I) and the periodontal pocket #47 was regenerated using DBX and a resorbable collagen membrane (BoneProtect, Dentegis, Duisburg, Germany).

Additionally, FPDs #34, 55, 44-47 were removed and the natural teeth abutments were prepared. Impression of the mandibular teeth abutments was taken using a polyether material (Impregum Penta Soft, 3M ESPE) and a master cast.

---

**Table 1:** Implant Characteristics.

<table>
<thead>
<tr>
<th>Implants area, Restoration (maxillo)</th>
<th>Implant Line Diameter x Length (mm)</th>
<th>Time (Months) until uncovering</th>
<th>Customized Abutments</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 (pod)</td>
<td>RN #, 4.1 x 10</td>
<td>4</td>
<td>Gold †</td>
</tr>
<tr>
<td>14 (old + new)</td>
<td>RN #, 4.1 x 10</td>
<td>4</td>
<td>Gold †</td>
</tr>
<tr>
<td>23 (pod)</td>
<td>RN #, 4.1 x 10</td>
<td>4</td>
<td>Gold †</td>
</tr>
<tr>
<td>24 (pod)</td>
<td>RN #, 4.1 x 10</td>
<td>4</td>
<td>Gold †</td>
</tr>
<tr>
<td>16 (peri)</td>
<td>SB #, 4.5 x 11.5</td>
<td>4</td>
<td>Co/Cd</td>
</tr>
<tr>
<td>15 (peri)</td>
<td>SB #, 3.75 x 10</td>
<td>4</td>
<td>Co/Cd</td>
</tr>
<tr>
<td>12 (peri)</td>
<td>SB #, 3.75 x 10</td>
<td>4</td>
<td>Co/Cd</td>
</tr>
<tr>
<td>23 (peri)</td>
<td>SB #, 3.75 x 10</td>
<td>4</td>
<td>Co/Cd</td>
</tr>
<tr>
<td>25 (peri)</td>
<td>SB #, 3.3 x 10</td>
<td>4</td>
<td>Co/Cd</td>
</tr>
<tr>
<td>26 (peri)</td>
<td>SB #, 4.5 x 10</td>
<td>4</td>
<td>Co/Cd</td>
</tr>
</tbody>
</table>

† = Portadur P4, Au 68.5%, Wieland, Pforzheim, Germany
‡ = Ankatit, Anka Guss, Waldaschaff, Germany
§ = Gold Bar, Dentegris, Duisburg, Germany
was made. After that, chairside temporary FPDs for the natural teeth abutments in the mandible were fabricated, using a self-curing composite material (Structur 2; VOICO, Cuxhaven, Germany). The dental technician fabricated: a) metal-reinforced long term provisional FPDs and b) final metal-ceramic FPDs (which were kept for later).

On the next day, the metal-reinforced temporary FPDs were fixed using a provisional cement (Temp-Bond, Kerr, Bioggio, Switzerland) and the maxillary denture and DentDu were fitted and the occlusion was controlled (Fig. 11).

The analysis of the articulated casts showed large vertical distances between the occlusal plane and the maxillary alveolar crest: 1.7 mm. Six implants were placed on the cast and mounted in the articulator (Fig. 15).

Implant abutments were fabricated using system specific customisable abutments (PTB, Denstrom, Duisburg, Germany) casted with CoCrMo alloy (Ankatit Laser, Ankatit-Anka Guss, Waldaschaff, Germany) and served as primary telescopes. Electroformed gold copings (0.25 mm thick; McGregor Galvanod, Au > 99.9 %, Wieland Dental, Pfalzgrafenweiler, Germany) were also fabricated over the customised implant abutments. The DentDu, the customized abutments and the gold copings were used for scanning, creating and milling of a titan framework (Zentron T1, Wieland Dental, Pfalzgrafenweiler, Germany). For veneering of the framework, a micro-ceramic composite was used (Ceramage, SHOFU Dental, Nagano, Germany). After veneering, the abutments were mounted with 51 Ncm (Fig. 16). The electroformed copings were placed on the abutments (Fig. 17) and fixed in the superconstruction using a self-curing cement (AGC Cem, Wieland Dental, Pfalzgrafenweiler, Germany).

At the same session, the final mandibular FPDs were fixed using an acrylic/aurethane based temporary cement (Implant Provisional, Allegro Inc., Snoqualmie, USA; Figs. 16–22).

**Discussion**

This case report details the treatment of a patient with insuffi-

The initially delivered denture allowed for the correction of the interocclusal relationship, tooth shape, colour, and angulation throughout the treatment period. In this way, the patient could become acclimatised to the function and aesthetics of the denture. By using a duplicate of this denture to take the bite records and as a mounting guide, the maxillo-mandibular relationship was re-

In the case presented here, the customised abutments were not removed after mounting and torqueing until the final restoration was fitted and placed. Thus, the position of the abutments remained unchanged, eliminating or minimising errors that might occur during repeated attachment of the abutments (for various test fittings of the restoration) to the implants and master cast. The fixation of the electroformed gold copings after and not before veneering eliminates additional errors which may occur due to the influence of the veneering composite during polymerization.

In the present report, the patient wished for a fixed restoration of the maxilla. Based on the planning model, he accepted a telescopic construction. In the case of a fixed implant-based denture, the crown-to-root ratio would have been unfavourable had natural teeth been used to support the restoration. To date, no long-term studies have documented the influence of the crown-to-root ratio on the success rate of implants fully. Researchers have postulated that an increase in crown-to-tooth and crown-to-implant ratios will cause an increase in the magnitude of non-axial forces transmitted to the tooth or implant. This, in turn, could cause increased vulnerability of either teeth or implant abutments and lead to the loss of supporting bone around the implants (Gomes-Polo et al. 2003).

The existing data does not allow any definitive conclusions to be drawn.

**In the present case, the patient's hard and soft tissues could have been augmented surgically to provide an aesthetically and functionally acceptable rehabilitation using fixed restorations. Cases such as this raise the question of whether it is preferable to exhaust all surgical possibilities or to pursue the path of least resistance by combining classic prosthetic experience with modern dental implants. In many circumstances, the latter is a better and safer treatment alternative. For this reason, oral surgeons and periodontists should consider the prosthetic treatment plan extremely carefully before selecting any course of action.**

**Editorial note:** A complete list of references is available from the publisher.
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Absorbed dose of radiation from dental and maxillofacial radiographic exposure in paediatric dentistry

While dental radiographs are common and it is argued that the radiation burden is negligible and consequently the risk of developing a fatal cancer from exposure to dental ionising radiation is non-existent, the effects of being exposed to ionising radiation are accumulative and young individuals run a higher risk.

Children younger than 10 years old run a risk three times higher than that of adults and children between 10 and 20 years old still run a risk twice as high as that of adults of developing a fatal cancer caused by ionising radiation. The non-threshold linear concept, derived from high-energy radiation exposure effects detected from unfortunate events such as those in Nagasaki, Hiroshima and Chernobyl, on which the stochastic effects of ionising radiation are based, has not shown that there are no effects; neither has it shown that there are. Nevertheless, until it has been proven that dental radiographs do not cause fatal cancers, we should consider them potentially harmful and we should act accordingly.

The estimated risk in adults of developing a fatal cancer from two ideally taken periapical radiographs (70 kV, 4 mA, 0.12 seconds exposure time, rectangular collimation) is 1 in 20 million, whereas the risk from a panoramic radiograph is 1 in 1,000,000.

CBCT is a great hype these days and has caused a tsunami in abundant and often unjustified use because it is marketed as being the ideal radiographic technique that provides the clinician with the ultimate 3D images and as having such a low radiation dose that the clinician should not be too concerned. Unfortunately, the comparison is made with medical CT and not with conventional 2D intra- or extra-oral radiography. Moreover, the huge variety of CBCT devices on the market makes these assumptions even more inaccurate. A CT scan of the skull equals about 2,000 periapical radiographs in radiation dose. A CBCT scan varies between 10 and 800 periapical radiographs in radiation dose, depending on the exposure settings (kV, mA and exposure time), field of view and resolution. Considering CBCT a low radiation dose radiographic technique is relative because this is determined by the dose of the radiographic technique with which it is being compared.

Estimating the potential risk of developing a fatal cancer induced by a CBCT scan is therefore not an easy task, but a conservative estimate is a risk of between 1 in 500,000 and 1 in 1,000,000. These figures are for adult patients and should be reassessed for children, as mentioned above. In order to put everything into perspective, the annual natural background radiation dose in Europe and the US equals about 2,500 and 5,600 periapical radiographs, respectively. Every (medical and dental) radiographic exposure has to be added to this figure.

There are three basic principles in the internationally supported radiation protection principles (optimisation principle) and be of optimal diagnostic yield. Perhaps that CBCT may be indicated in a severe skull trauma case, where intracranial or submandibular haemorrhage has to be detected accurately for diagnostic purposes. CBCT would in that case be insufficient, but it could serve perfectly in a dento-alveolar trauma case. Each technique has its own advantages and disadvantages, but the proper knowledge of every technique will allow the clinician to make the correct and well-considered choice.

Dr Johan K.M. Aps
USA

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There is often confusion about absorbed dose of radiation, equivalent dose and effective dose, and these terms are often used ambiguously. The absorbed dose is a measure of the amount of energy absorbed from the radiation beam per unit mass of tissue. The official unit is the gray and used to be expressed as the rad (radiation absorbed dose; 1 Gy = 100 rad).

The equivalent dose is a measure that allows the different radiobiological effectiveness of different types of radiation to be taken into account. A radiation weighting factor (W) represents the biological effects of each type of radiation. For X-rays, this weighting factor equals 1, while for alpha particles it equals 20, meaning that the impact of being exposed to alpha particles is 20 times higher than the impact of being exposed to X-rays. The official unit of equivalent dose is the sievert and used to be the rem (röntgen equivalent man; 1 Sv = 100 rem).

The effective dose allows doses from different investigations of different parts of the body to be compared. The tissue weighting factor (Wt) has been introduced for radiosensitive organs and tissues. For example, the Wt for the thyroid gland and for the oesophagus is 0.05, whereas for the salivary glands it is only 0.01.

What can dental care providers and clinicians practically speaking do to respect the rules of radiation protection? Besides justification assessment, one should try to keep the radiation as low as reasonably achievable. This can be accomplished with appropriate beam collimation and is supported by research and is mentioned in every textbook on oral and maxillofacial radiology. It has been shown to be the most effective measure one can take to achieve the lowest radiation burden for the patient, while still obtaining the best-quality images possible.

Collimation indicates that the surface being irradiated is at least as small as the image receptor being used and it should only cover the area of interest. Therefore, using rectangular collimation for intra-oral radiography makes logical sense. Why should one use a circular collimator to direct X-rays at a rectangular image receptor?

Using rectangular collimation, one can reduce the radiation burden to the patient by 50 per cent. The use of a proper image receptor holding device to enable aim of the X-rays perpendicular to the image receptor and the use of a rectangular collimator will also improve the image quality. The latter is because the radiation scatter, which will cause deterioration of the image, is proportionate to the size of the area that has been exposed.

Lead shielding is meant to protect the patient's tissue from accidental exposure to the primary radiation beam. The radiation that is scattered in the patient's tissue cannot be trapped by a lead apron.

In paediatric patients, it is, however, important to shield the thyroid gland, as this organ appears to be very sensitive to ionizing radiation. The proper use of a lead thyroid collar or shield is also promoted in every radiology handbook and numerous scientific papers.

It is our duty as clinicians to stand guard over the safety of our patients and as long as research has not shown that dental radiographic exposure is without any risk, we should act as if it is.

Editorial note: On Friday, 14 June, 2013, Dr Aps will be presenting a paper on absorbed radiation dose from dental and maxillofacial exposures in paediatric patients at the IAPD Congress in Seoul, South Korea.

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Special needs patients: Rolling the dice

Prof. Leda Mugayar

According to a 2005 definition by the Joint Advisory Committee for Special Care Dentistry in the UK, “individuals who have a physical, sensory, intellectual, mental, medical, emotional or social impairment or disability or, more often, a combination of those factors” are considered special needs or special care patients. It is evident from this that special care dentistry addresses the needs of a broad range of patients.

Many people with disabilities occur in medical conditions have difficulty accessing oral health services, and, consequently, achieving good oral health. The number of people with special needs living in the community and requiring oral health care has been significantly on the rise owing to improvements in medical care, the decreased need for institutional care, and changes in societal values.

Many of these individuals require additional assistance that extends beyond local anaesthesia in order to undergo dental treatment. The decision-making process regarding the selection of a method of treatment or a combination of methods that facilitate dental treatment for these individuals must be considered. The aim of such efforts is to assist oral health professionals and other parties in planning and administering oral health care to patients with special needs. Consideration must be given to planning treatment and alternative treatment modalities, as well as the implications of combinations, regarding the repeated or frequent use of these approaches.

The dental profession has developed and currently employs a number of methods to help individuals with special needs undergo dental treatment. These include general anaesthesia, sedation (ranging from minimal to deep sedation), and behavioural and physical support. The choice of one or more of the treatment modalities should only be made after careful consideration of the associated risks and benefits. It is important to consider the longevity of the treatment as part of a long-term plan for achieving and maintaining the oral health of the individual concerned. Also, improvement in terms of helping individuals receive dental care with less pharmacological, behavioural or physical support, and maintaining oral health immediately after the procedures must be addressed.

An intensive preventive programme should be introduced in order to maintain the patient’s oral health after dental procedures and to reduce the patient's risk of developing new or recurring oral diseases in the future. In order to maintain the treatment needs of patients with special needs, preventive strategies combined with behavioural, psychological and, when possible, social support or intervention that lessen the need for pharmacological interventions or physical support.

Preventive interventions can therefore reduce the incidence of oral disease and consequently decrease the necessity of dental procedures. More importantly, prevention programmes do not have side-effects, unlike treatments that require the use of medication.

Finally, the pursuit of and advocacy for adequate education and early intervention and prevention should be paramount for patients with special needs.

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Disease management of ECC: Results of a quality improvement collaborative project

Dr Man Wai Ng
USA

At Boston Children's Hospital in the US, where I am Dentist-in-Chief, at one time, we experienced long waiting times for children awaiting dental treatment in the operating room. Furthermore, the relapse rate post-treatment was unacceptably high, and the costs of general anaesthesia were significant.

Until recently, standards of care for early childhood caries (ECC) called for restorative and surgical treatment, along with general recommendations to change dietary and oral hygiene practices. Young children who are not co-operative and children with special care needs who require restorative treatment are commonly sedated under general anaesthesia. It is now known that restorative treatment alone cannot address the disease process. Unless disease aetiology is addressed, new and recurrent caries is likely to occur.

At Boston Children's Hospital, we sought a better way to care for the dental needs of our patients with ECC. With support from the DentQuest Institute, we conducted a quality improvement demonstration project to test the feasibility of implementing a chronic disease management approach to ECC (ECC Phase 1) at Boston Children's Hospital in Massachusetts and St Joseph's Hospital in Rhode Island. Chronic disease management differs from the traditional approach of telling the patient what to do. Instead, it involves the care provider working with the patient or parent to understand the causative factors of the disease and to aid in selecting self-management goals to address the aetiological factors of the disease.

The ECC I results after 50 months demonstrated that children in the ECC disease management group experienced lower rates of new cavitated lesions, pain and referrals for restorative treatment under general anaesthesia in the operating room compared with baseline historical controls. An economic evaluation of the disease management model for ECC management conducted at one of the sites found that the additional costs of the ECC intervention were offset by the reduction in restorative and operating room care. In 2011, ECC Collaborative Phase II, also funded by the DentQuest Institute, expanded the project to five other sites in the US over an 18-month period. The clinical outcomes were similar to those described for Phase I. At Boston Children's Hospital, the disease management approach is now the standard of care. We have shorter waits for patients awaiting treatment in the operating room and greater flexibility in scheduling operating room care for those patients who need it.

We conclude that a chronic disease management approach to addressing ECC utilising quality improvement strategies can be implemented in dental practices and has the potential to deliver better care, improve clinical outcomes and reduce costs. Further testing of the chronic disease management approach is needed in diverse settings. For a successful paradigm shift to risk-based disease prevention and management to occur, reimbursement is needed for paediatric Cardiopulmonary Arrest, non-surgical management of caries, more frequent risk-based disease management visits, education, and counselling for some suitable patients. These activities are not presently reimbursable by insurance in the current US fee-for-service system.
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A graduate of the University of Minnesota, School of Dentistry, he is an accredited member of the American Academy of Cosmetic Dentistry and a Board Examiner for accreditation. Dr. Milnar maintains a full-time practice in St. Paul, Minnesota emphasizing appearance related dentistry.

He has published numerous articles about the direct placement of composites, shade selection and porcelain materials. Dr. Milnar is co-founder of the Minnesota Academy of Cosmetic Dentistry and has lectured extensively within the U.S. Armed Forces as well as internationally on the subject of direct composite restorations, shade selection and porcelain materials. He has been voted “Top Dentist” for the last several years in the Minneapolis/St. Paul Magazine.

He has been voted by Dentistry Today as one of the top 100 dentists contributing to dental education. Log on to our website for more details.

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